

UNITED STATES OF AMERICA:  
WAR DEPARTMENT.

# MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

AUGUST, 1889.

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1889.

*List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of August, 1889.*

Name of vessel.	Captain.	Name of vessel.	Captain.	Name of vessel.	Captain.
Am. s. s. Adirondack .....	J. Sanson.	Ger. s. s. Gothia .....	A. Kuhn.	Br. s. s. State of Indiana .....	A. Ritchie.
Br. Adriatic .....	J. G. Cameron.	Greece Guido .....	A. J. Jeffrey.	State of Nebraska .....	A. G. Bras.
Advance .....	D. E. Griffiths.	Hammonia .....	E. Lachiondo.	State of Nevada .....	J. A. Stewart.
Alaska .....	J. W. Morris.	Hekla .....	H. Vogelgesang.	State of Pennsylvania .....	A. J. A. Mann.
Algers .....	G. S. Murray.	Helvetia .....	A. G. Thomsen.	State of Texas .....	G. Williams.
Alene .....	F. W. Mason.	Hibernian .....	G. Cochran.	Strathairly .....	D. Boughton.
Alvena .....	E. J. Seiders.	Hindoo .....	John Brown.	Suevia .....	C. Ludwig.
Alvo .....	F. McKay.	Holland .....	Jas. Douglas.	Switzerland .....	J. Ueberweg.
America .....	David Williams.	Holsatia .....	Thos. Foote.	Taormina .....	G. W. Koch.
Amsterdam .....	A. Kohlmann.	Howick .....	G. Busch.	The Queen .....	T. P. Heeley.
Anchoria .....	G. Stenger.	Hugo .....	J. Ellis.	Thingvall .....	S. T. H. Laub.
Angers .....	A. Campbell.	Hungaria .....	A. de Mugica.	Toronto .....	J. MacAuley.
Arabic .....	James Pinkham.	Indiana .....	Droesch.	Timor .....	W. Hodgson.
Ardangorm .....	S. Brooks.	Iowa .....	W. J. Boggs.	Tower Hill .....	H. P. Bennett.
Arizona .....	H. Cameron.	Island .....	E. W. Owens.	Tordenskjold .....	C. Urchermann.
Ascania .....	P. Froehlich.	Italy .....	W. Skjott.	Trave .....	W. Willegood.
Athos .....	H. Low.	Italy .....	G. Schmidt.	Trinacria .....	G. Mitchell.
Augusta Victoria .....	A. Albers.	Jamaican .....	W. Pearce.	Trinidad .....	W. J. Fraser.
Aurania .....	H. McKay.	Kansas .....	D. Edwards.	Ulunda .....	T. Clark.
Author .....	J. G. Jones.	Kathleen .....	A. Fenton.	Umbria .....	W. McMillan.
Balder .....	L. Christie.	Kohn .....	R. Mackay.	Vancouver .....	C. J. Lindahl.
Baltimore .....	J. W. Simpson.	Kong Alp .....	G. H. Meier.	Vandam .....	A. J. Potter.
Barracouta .....	R. R. Hubbard.	La Bourgogne .....	J. Dahl.	Venetian .....	E. Parry.
Barrowmore .....	W. H. Moore.	La Bretagne .....	E. Franguel.	Venice .....	A. E. Bolt.
Belgenland .....	W. A. Beynon.	La Champagne .....	M. de Jouselin.	Viking .....	S. H. Frus.
Bellenna .....	A. Blakelock.	La Flandre .....	Boyer.	Viola .....	L. Murray.
Benito Estenger .....	E. P. Canal.	La Gascogne .....	E. Smith.	Werra .....	H. Bussius.
Beritta .....	L. Santaulari.	Lahn .....	Santelli.	Westernland .....	J. C. Jamison.
Bohemia .....	H. Leithausen.	Lake Huron .....	H. Hellmers.	Wieland .....	H. Barends.
Bothnia .....	J. H. Watt.	Lake Nepigon .....	P. D. Murray.	William Cliff .....	E. Winder.
Braunschweig .....	A. Meier.	Lake Ontario .....	C. F. Herriman.	Wisconsin .....	J. P. Worral.
Britannia .....	Coste.	Lake Superior .....	H. Campbell.	Wylo .....	T. Rogers.
Britannic .....	H. Davison.	Lake Winnipeg .....	Wm. Stewart.	Wyoming .....	C. L. Rigby.
British Empire .....	R. Willis.	Lampassas .....	P. D. Murray.		
British King .....	John Kelly.	La Normandie .....	A. B. Connor.	United States Naval.	
British Prince .....	S. Nowell.	Lero .....	G. Collier.	U. S. C. S. A. D. Bache .....	J. F. Moser.
British Princess .....	E. H. Freeth.	Llandaff City .....	J. Chisholm.	U. S. F. C. Albatross .....	Z. L. Tanner.
Brooklyn City .....	W. Pitt.	Lord Clive .....	T. H. Gore.	U. S. S. Alliance .....	G. W. Pignam.
Buffalo .....	J. H. Malet.	Lord Clive .....	P. Urquhart.	U. S. S. Atlanta .....	J. A. Howell.
Bulgarian .....	R. Leask.	Lord Gough .....	E. M. Hughes.	U. S. C. S. G. S. Blake .....	J. E. Pillsbury.
Burgundia .....	F. Dulac.	Lord O'Neill .....	A. Ferris.	U. S. S. Boston .....	J. O'Kane.
California .....	R. T. Garvie.	Lylian Monarch .....	T. C. Huggett.	U. S. S. Despatch .....	W. S. Cowles.
Californian .....	J. M. Picktail.	Maine .....	H. Griffith.	U. S. S. Dolphin .....	G. F. F. Wilde.
Canada .....	J. Robinson.	Manitoba .....	J. M. Johnstone.	U. S. S. Enterprise .....	H. H. McCalle.
Camellia .....	E. Penney.	Marenhense .....	Thos. Pole.	U. S. S. Iroquois .....	J. Bishop.
Caribbean .....	H. Daniel.	Marsala .....	N. Maass.	U. S. S. Lancaster .....	T. F. Kane.
Carroll .....	W. F. Evans.	Martello .....	Wm. Abbott.	U. S. S. Minnesota .....	G. C. Witte.
Catalonia .....	J. J. Atkin.	Maryland .....	A. H. Luckhurst.	U. S. S. New Hampshire .....	J. F. Higginson.
Catania .....	H. M. Franck.	Mentmore .....	B. Waite.	U. S. S. Ossipee .....	A. G. Klogg.
Coarense .....	J. G. Heath.	Michigan .....	S. Walters.	U. S. S. Ranger .....	F. A. Cook.
Celtic .....	J. E. Smith.	Minnesota .....	T. L. Evans.		
Cephalonia .....	Thomas Dutton.	Moravia .....	R. J. Blacklin.	Sailing vessels.	
Cervin .....	S. Hughson.	Mount Edgecombe .....	Winkler.	Am. bg. Abbe Clifford .....	D. W. Storer.
Chateau Lafite .....	M. C. Olliver.	Munchen .....	J. Wetherel.	Br. bk. Ada Pear .....	N. Hocken.
Cherokee .....	H. A. Barse.	Nederland .....	A. Jaeger.	Am. schr. Addie Jordan .....	W. H. Harriman.
Circassia .....	J. Harris.	Nesmore .....	E. Bence.	Am. schr. Agatha .....	C. F. C. Bohr.
Circassian .....	H. Barrett.	Nestorian .....	G. Elliott.	Ger. Auguste .....	H. Schumacher.
City of Alexandria .....	J. McIntosh.	Nevada .....	J. France.	Am. schr. Anna E. Krans .....	T. Newcomb.
City of Augusta .....	J. W. Catherine.	Newham .....	J. A. R. Cushing.	Belle of the Bay .....	J. W. Emmons.
City of Berlin .....	E. Barf.	Newport .....	Stabel.	Ger. sp. Chas. Luling .....	C. Wiche.
City of Chicago .....	A. Redford.	New Orleans .....	C. C. Lima.	Br. Chas. S. Whitney .....	Geo. D. Spicer.
City of New York .....	F. E. Land.	Noordland .....	T. P. C. Halsey.	Ger. bk. Charlotte and Annie .....	Emil Kruger.
City of Paris .....	F. L. Lockwood.	Norseman .....	H. E. Nickels.	Am. schr. City of Baltimore .....	L. S. Tawes.
City of Rome .....	Fred. Watkins.	Northgate .....	R. Williams.	Am. schr. Clara Goodwin .....	Frank Wynan.
Cofina .....	H. Young.	Nova Scotia .....	W. Ramsdale.	Ger. sp. Cleopatra .....	A. Von Seggern.
Colon .....	R. C. Jennings.	Nueces .....	R. H. Hughes.	Am. bk. Clotilde .....	I. W. Bowden.
Columbia .....	F. Henderson.	Obdam .....	J. Bolger.	Am. schr. Era .....	J. O. Spicer.
Counsellor .....	C. Heibich.	Oceanic .....	G. Bakker.	Br. Etta A. Watt .....	J. W. Bennett.
Crown Prince .....	W. Lang.	Ohio .....	J. Metcalf.	bk. Eudora .....	R. Thorson.
Crystal .....	J. Scrivener.	Ontario .....	P. L. Moore.	sp. Falls of Afton .....	H. J. Lewis.
Cuban .....	R. B. Stannard.	Oranmore .....	W. F. Couch.	Am. schr. Florence Randall .....	F. McGarity.
Dalton .....	D. Lawson.	Oregon .....	H. C. Williams.	sp. Falls of Afton .....	J. L. Randall.
Damara .....	J. Russell.	Orinoco .....	J. S. Garvin.	Aust. bk. Francesca T .....	M. P. Martinolich.
Denmark .....	Geo. Dixon.	Othello .....	H. Mundy.	Am. sp. Francis .....	A. Doane.
Devonia .....	R. S. Rigby.	Palestine .....	W. Whiteway.	Am. bk. Havilah .....	W. S. Richardson.
Donau .....	Jno. Craig.	Parisian .....	J. Ritchie.	Am. bk. Henry A. Faber .....	G. W. Hodgdon.
Durham City .....	W. Topser.	Pavonia .....	H. McKay.	Br. bk. Iodine .....	H. E. Gardick.
Durham City .....	J. A. Jacobsen.	P. Caland .....	G. Lutz.	Am. schr. Jennie S .....	Adam Smith.
Earnmoor .....	R. Grey.	Pecunia .....	G. Evans.	bk. John R. Stanhope .....	Chas. Sinclair.
Earnwell .....	W. H. Carter.	Pennland .....	C. H. Grant.	bk. John R. Stanhope .....	W. H. Squires.
Edam .....	W. Bakker.	Peruvia .....	J. M. Wallace.	bkt. Jose E. Moro .....	J. B. Norton.
Edith Godden .....	J. H. Bennett.	Phonician .....	J. Kerr.	Josephine .....	Asmus Leonard.
Edith Hough .....	J. Foley.	Polynesia .....	G. Franck.	pilot Joseph F. Loubat .....	C. Brown.
Egypt .....	J. Sumner.	Pontine .....	R. Blythe.	schr. Kate Church .....	J. McCarthy.
Egyptian Monarch .....	T. M. Irvin.	Portia .....	F. Ash.	bk. Kennard .....	J. H. Weeks.
Eliza .....	H. Bermpohl.	Prins Maurits .....	A. Subbelee.	bk. Kennard .....	J. A. Bettencourt.
Elber .....	H. Baur.	Prussian .....	J. Ambury.	Br. bk. Konomo .....	J. Stohf.
Elber .....	R. Sander.	Rembrandt .....	N. Way.	Ger. Leonadia .....	J. V. McKown.
El Paso .....	H. S. Quick.	Rhaetia .....	E. Kopf.	Am. bg. L. F. Munson .....	Andrew Jackson.
El Monte .....	R. B. Quick.	Rhenania .....	Schaffer.	sp. Light vessel No. 45 .....	F. Ash.
Ema .....	T. Jungst.	Rhyndland .....	A. J. Griffin.	schr. Maud H. Dudley .....	D. W. Oliver.
England .....	A. F. Heeley.	Richmond Hill .....	H. H. Perry.	Br. bkt. Mobil .....	R. J. Nilsson.
Entella .....	R. Bruno.	Robinia .....	T. H. Smith.	Br. bk. Muriel .....	J. Bale.
Enrique .....	R. de Abernuri.	Rosarian .....	D. McKillop.	Am. schr. Phoebe .....	M. Medero.
Erin .....	W. Tyson.	Rosse .....	J. Inch.	Ger. bk. Polly Stott .....	F. Harder.
Ethiopia .....	T. K. Erham.	Rugia .....	H. C. v. d. Zee.	Nor. Qvos .....	G. Olsen.
Etruria .....	John Wilson.	Saale .....	B. Karlowa.	Am. bg. Robert Mowe .....	G. Salvesen.
Exeter City .....	W. H. P. Hains.	Saint Romans .....	B. Blanke.	Br. bk. Salina .....	W. Peterson.
Exelsior .....	H. L. Higgins.	Samarra .....	H. Campbell.	Am. bk. Shannon .....	J. Robinson.
Federico .....	A. Jorina.	Santiago .....	T. Hewitson.	Br. bk. Sodium .....	G. W. Murray.
Ferrando .....	M. Hetherington.	Sardinian .....	J. B. Allen.	Am. bk. Serran .....	J. Robinson.
France .....	A. D. Hadley.	Sarnia .....	W. Richardson.	Br. bk. Serran .....	R. Cosgrove.
Frankfurt .....	C. Steencken.	Scandinavian .....	J. Gibson.	Am. sp. Serran .....	W. Munson.
Faula .....	R. Ringk.	Scythia .....	T. Roberts.	Nor. bk. Serran .....	E. Scott.
Galileo .....	W. Magee.	Seneca .....	F. Stevens.	Am. bg. T. Towner .....	J. Thordalson.
Gallier .....	C. Kaempff.	Servia .....	H. Walker.	Br. bk. Union .....	C. E. Dayton.
Germanio .....	H. Davison.	Siberian .....	R. P. Moore.	Ger. sp. Union .....	H. Fokken.
Glendale .....	W. Dickinson.	Sif .....	H. Bentzon.	Br. bk. Valona .....	H. Andrews.
Gluckauf .....	J. Newdick.	Slavonia .....	H. Schmidt.	Am. yacht Viking .....	J. M. Mason.
Godrevy .....	V. Szymanski.	Spain .....	W. A. Griffiths.	Nor. bk. Walla .....	L. E. Wichart.
	W. H. Jamieson.	State of Georgia .....	G. Moodie.	Am. Yarmoyden .....	D. Walters.



# UNITED STATES SIGNAL SERVICE

## MONTHLY WEATHER REVIEW.

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WASHINGTON CITY, AUGUST, 1889.

No. 8.

### INTRODUCTION.

This REVIEW is based on reports from 2,208 stations in the United States and Canada for August, 1889, comprising data received from regular and voluntary observers of both countries. These reports are classified as follows: 180 Signal Service stations; 117 monthly registers from United States Army post surgeons; 1,381 monthly registers from state weather service and voluntary observers; 24 Canadian stations; 171 stations through the Central Pacific Railway Company; 335 marine reports through the co-operation of the Hydrographic Office, United States Navy; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Arkansas, Colorado, Dakota, Illinois, Indiana, Iowa, the Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

#### CHARACTERISTICS OF THE WEATHER FOR AUGUST, 1889.

During August, 1889, six low pressure storms appeared within the region of observation over the North American continent, the average number traced for the corresponding month of the last fifteen years being nine and seven-tenths, and eight storms were traced over the north Atlantic Ocean. Severe local storms were most frequently reported in New York, Pennsylvania, Minnesota, and Kansas, and they were more generally noted on the 1st, 3d, 4th, 7th, 13th, and 14th. The most important storm of the month on the north Atlantic Ocean advanced northward off the coast of the United States between the thirtieth and fortieth parallels of latitude from the 25th to 27th, inclusive, attended at sea by gales of great violence. The disturbances in the Caribbean Sea and the Gulf of Mexico preceding the appearance of this storm did not, apparently, possess well-defined movements of translation. The Arctic ice

reported did not differ materially in distribution and quantity from the average for the month, and the fog reported west of the fortieth meridian west of Greenwich about equalled the usual amount for August.

The mean temperature was lower than usual in the Atlantic coast states and thence westward south of the Great Lakes to the eastern slope of the Rocky Mountains, in the valley of the Columbia River, and at Los Angeles, Cal.; elsewhere the month was generally warmer than the average August. In districts where the mean temperature was below the average the departures were less than five degrees, while at stations in the British Possessions north of Montana the mean temperature was more than five degrees above the average August values. At Fort Assiniboine, Mont., the highest absolute temperature recorded for August during the period of observation was reported, while at Portland, Me., Jacksonville and Key West, Fla., the minimum temperature was lower than noted for the corresponding month of previous years. Killing frost occurred at Galena, Ill., on the 1st; at Grand Rapids, Wis., the night of the 4-5th, and at Linkville, Oregon, on the 19th.

The rainfall of the month was very irregularly distributed, and was greatest in areas in the Atlantic coast states, and in Nebraska, where it exceeded ten inches. Over a considerable portion of California and Nevada no rain fell, and in parts of Illinois, Indiana, Iowa, Michigan, and Pennsylvania the rainfall for the month was the least ever reported for August. Snow was reported at one place only, Greensburgh, Pa., on the 15th. Disastrous floods occurred in parts of Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, Colorado, Missouri, and Nebraska, and damaging drought was reported in sections of Montana, Dakota, Missouri, Kansas, Utah, Texas, Iowa, Michigan, Minnesota, Illinois, and Ohio.

A well-defined auroral display was observed at Saint Vincent, Minn., on the night of the 28-29th; noteworthy solar halos were reported at three stations in New York on the 23d; and brilliant meteors were noted in Georgia on the 11th, in Texas on the 14th, and in Washington Territory on the 22d.

#### ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for August, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for August, obtained from observations taken twice daily at the hours named, and that determined from hourly observations varied at the stations named below as follows: At Washington, D. C., Philadelphia, Pa., New York, N. Y., Boston, Mass., Saint Louis, Mo., and Chicago, Ill., the mean of the 8 a. m. and 8 p. m. observations was higher by .011, .006, .006, .007, .001, and .003, respectively, than the true mean pressure.

The mean pressure for August, 1889, was highest within an area extending from the Atlantic coast between the twenty-eighth and thirty-eighth parallels to the Ohio Valley, where

the values rose above 30.10, the highest mean readings, 30.14, being noted at Charlotte, N. C., and Knoxville, Tenn. In districts east of the ninety-seventh meridian and south of the latitude of Lake Superior, and on the Pacific coast north of the fortieth parallel, the mean pressure was above 30.00. The mean pressure was lowest within an area extending from the lower Colorado valley over southeastern California and southwestern Nevada, where the readings were below 29.80, the lowest mean values, 29.76 and 29.77, being noted at Yuma, Ariz., and Keeler, Cal., respectively. From this region north-eastward over the middle and northern plateau regions and the northeastern slope of the Rocky Mountains the mean pressure was below 29.90, and fell below 29.85 in the British Possessions north of Montana.

A comparison of the pressure chart for August, 1889, with that of the preceding month shows that a general increase in pressure occurred east of the one hundredth meridian, save over the southern half of Florida, where there was a slight decrease, and along the immediate west Gulf coast, where the mean pressure was about the same. Over the western half of the country there was an increase in pressure in the middle and southern plateau regions, the middle, eastern, and southeastern slopes of the Rocky Mountains, and in the valley of the Columbia River and Oregon; while over Montana, and thence southwestward to and along the California coast, there was a slight decrease. The most marked increase in mean pressure occurred from the lower Missouri valley to New England, where it exceeded .10, and the greatest decrease in north-central Montana and the British Possessions to the northward, where it was more than .05. For July, 1889, the mean pressure rose to 30.10 at but one station, Jupiter, Fla., while for the current month this value was exceeded over a considerable area in the southeastern part of the country. Within the area of low pressure over the southern plateau region the mean values remained about the same.

Compared with the normal pressure for August the mean pressure for the current month was above the normal, except in the upper Missouri and Red River of the North valleys and thence westward over the northern plateau region, in California, southern Arizona, southern New Mexico, and southwestern Texas. The greatest departures above the normal occurred at stations in North and South Carolina, where they equalled or exceeded .10, and the most marked departures below the normal were noted in north-central Montana, extreme southwestern California, and southwestern Texas, where they were .05, or more. The departures above the normal pressure generally exceeded .05 east of the Mississippi River and south of the Lake region, while over the middle and southeastern slopes of the Rocky Mountains, the middle, and a portion of the southern, plateau region, and along the immediate north Pacific coast, they were less than .05.

#### BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In August, 1889, the ranges were greatest in the upper Missouri and Red River of the North valleys, where they exceeded .70. From this region they decreased eastward to New England, where they varied from .53 to .65; southeastward to the south Atlantic and east Gulf coasts, where they were less than .30; southward to the Rio Grande valley, where they fell below .20; southwestward to the south Pacific coast, where they ranged from .25 to .30; and westward to the north Pacific coast, where they amounted to .70 in northwestern Washington. Along the Atlantic coast the monthly ranges varied from .24, at Key West, Fla., to .65 at Albany, N. Y.; between the eighty-second and ninety-second meridians, .21 at Port Eads, La., to .67 at Sault de Ste. Marie, Mich.; between the Mississippi River and the Rocky Mountains, .19 at Brownsville, Tex., to .76 at Saint Vincent, Minn.; in the plateau and Rocky Mountain regions, .24 at Whipple Barracks (Prescott), Ariz., to .74 at Helena, Mont.; on the Pacific coast, .25 at San Diego, Cal., to .70 at Port Angeles, Wash.

#### AREAS OF HIGH PRESSURE.

Seven areas of high pressure were observed within the limits of the country during the month of August; three of which approached from the Pacific coast; two were first observed as they approached the stations from the regions north of Dakota; one was the continuation of the high area off the Atlantic coast at the end of July; and one approached the Saint Lawrence Valley from the direction of Hudson Bay.

The direction of movement of these areas while east of the

Rocky Mountains was generally to the south of east; area number vii, however, moved somewhat to the northeast, apparently under the impulse of the tropical storm approaching along the Gulf Stream. After the disappearance of the storm its course was to the south.

Six of the areas observed disappeared off the south Atlantic coast and one disappeared by gradual decrease of pressure while central over the Rocky Mountain regions.

The following tables exhibit some of the more prominent characteristics of the high areas:

TABLE I.

No.	First observed.			Last observed.			Duration.	Velocity per h'r.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Lat. N.			Date.	Station.	Reading.
I.....	1	45	63	27	80	4.0	13.0	1	Halifax, N. S.		Inches.
II.....	1	52	115	35	100	2.0	.....	1	Calgary, N. W. T.		30.24
III.....	4	49	97	33	80	6.0	15.0	5	La Crosse, Wis.		30.32
IV.....	5	48	122	35	76	6.0	19.0	10	Saint Vincent, Minn.		30.34
V.....	14	48	97	30	82	6.0	12.0*	20	Knoxville, Tenn.		30.30
VI.....	19	46	123	37	76	4.0	26.0	21	North Platte, Nebr.		30.28
VII.....	24	47	75	37	81	6.0	14.0	27	Halifax, N. S.		30.32
Mean.....		48	99	34	82	4.8	16.5	.....			30.31

\* This is the rate of progression till reaching the vicinity of the coast; its movement thereafter was much retarded.

TABLE II.

Number.	Maximum abnormal rise in pressure in twelve hours.			Maximum abnormal fall in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
I.....	.14	{ Baltimore, Md. .... Philadelphia, Pa. ....	4	12	Northfield, Vt. ....	3	38	s.	1
II.....	.38	Denver, Colo. ....	1	17	Medicine Hat, N. W. T.	1	36	sw.	2
III.....	.30	Fort Elliott, Tex. ....	4	12	Little Rock, Ark. ....	4	44	n.	4
IV.....	.30	Ft. Assiniboine, Mon.	6	23	Qu'Appelle, N. W. T.	6	38	n.	9
V.....	.30	La Crosse, Wis. ....	14	18	Springfield, Mo. ....	14	42	nw.	14
VI.....	.38	{ Valentine, Nebr. .... North Platte, Nebr. ....	20	26	Valentine, Nebr. ....	20	42	nw.	20
VII.....	.20	{ Montrose, Colo. .... Sault Ste. Marie, Mich.	30	29	Qu'Appelle, N. W. T.	28	40	ne.	27

I.—This is a continuation of high area number ix of July. The centre of high lay apparently some distance off the coast, but the greater part of the country east of the Mississippi was embraced within its influence. Rains prevailed in the Atlantic and east Gulf states during the greater part of the time that these sections were embraced within the high area, the wind directions along the coast prevailing from the seaward. The course of this area during August was generally coincident with the coast line to the south. On the morning of the 2d it was central off the Carolina coast, with a maximum recorded pressure of 30.24. Thereafter, with gradually diminishing pressure, it slowly moved over Florida and disappeared off the east coast on the 5th. The most marked feature of this high was the rain-area which persistently attended.

II.—On the morning of the 1st this area was central to the northwest of Montana, but had extended southward as far as Colorado. It moved slowly to the southeast, the pressure diminishing and its definite character gradually disappearing, so that by the evening of the 2d it had merged with the high area off the Atlantic coast as an outlying ridge. It was attended by fresh to high northwesterly winds and considerable reduction in temperature in the early stages of its progress, otherwise no unusual conditions were developed, its disappearance by gradual decrease in pressure being attended by cool, fair weather.

III.—This area apparently moved over from the north Pacific coast. It made its appearance as a well-defined high at northern Minnesota stations on the evening of the 3d, causing the first frost of the month. It rapidly extended its influence



southward, attended by high winds in Kansas, Indian Territory, and northern Texas, and by an extensive rain-area in its southern quadrants. As its chilling effects reached the trough of low in its front occasional heavy rains were produced. By the 5th the area (then central over Wisconsin) had attained its maximum pressure, 30.34 inches. With a slight reduction from this maximum, the pressure thereafter remained fairly constant during the six days of the progress of the high across the country. Rain in varying quantities, heavy at times, fell in the Gulf and south Atlantic states while under the domination of this high. The area was generally well defined, and in the central portions clear, cool weather prevailed. In consequence of the formation of a low in its rear, high winds were produced in the wake of the high which, at one stage of its course, reached an hourly velocity of sixty miles. The gradient was slight, and no specially high velocities were generated in advance of the high. The course of this area was to the south-east till reaching southern Michigan, where it remained stationary for two days. It then resumed its progress, moving slightly to the north of east till reaching New England, after which it gradually settled southward, disappearing off the Carolina coast.

IV.—This area was first observed on the north Pacific coast, in which locality it remained for several days, with marked fluctuations in pressure. By the 9th it had moved over into Dakota, with a well-defined centre. Its path for the succeeding two days was somewhat erratic, the centre of greatest pressure on the morning of the 9th appearing in central Dakota, on the evening of the same date in southern Nebraska, the following morning in northern Minnesota, and during the next twelve hours again moving southward to Iowa. Thereafter its course was generally to the south of east, with a uniform rate of movement till reaching the North Carolina coast on the night of the 12th. After remaining in this locality for twelve hours longer it disappeared. During the entire progress of this area rains were observed in its southern quadrants, the rain-area at times being considerably extended, with occasional heavy precipitation in localities.

V.—This area also approached the stations from the Pacific. By the morning of the 14th it had progressed as far eastward as Minnesota, at which time a storm of considerable energy was central over the lower lakes, with a trough of low extending southwestward to northern Texas. As this storm moved off, the area of high pressure rapidly extended east and south, producing high winds in Nebraska, Kansas, Missouri, Arkansas, southern Illinois, and western Kentucky and Tennessee. Until the night of the 15th its course was to the south, and the high area extended from Lake Superior to the Gulf and from Kansas to Ohio. After some delay in the valley of the Mississippi it moved slowly eastward to the coast without decided change in pressure, its movement being greatly retarded as it approached the ocean. On the night of the 19th it was apparently central off the south Atlantic coast, but later reports showed it to have again moved inland with some increase in pressure. Its subsequent course was to the south-east over Florida, the morning report of the 21st showing a continuous ridge of high from this section to the Northwest in conjunction with the high area then central over the Rocky Mountain stations. In the earlier stages of its progress it was attended by an extensive rain-area to its southeast, which gradually gave place to clear weather as the area advanced.

VI.—It was possible to trace the progress of this area from the Pacific to the Atlantic. It definitely began its easterly movement on the 19th, but for thirty-six hours previous its position on the north Pacific coast could be approximately located. It moved to the southeast with considerable rapidity until reaching the eastern slope of the Rocky Mountains; here its progress was much delayed, the pressure somewhat diminishing but its area extending. It subsequently disappeared to the eastward, passing off the middle Atlantic coast. During the passage of this high area over the Rocky Mountain regions high wind velocities were developed in conjunction

with the low area in its advance in Montana, Dakota, Kansas, and Nebraska, and a very considerable fall in temperature was recorded in these localities, the high velocities and falling temperature also preceding the high and following in the wake of the low in its passage over the Lakes.

VII.—This area first made its appearance over the Great Lakes on the morning of the 24th, having apparently approached the stations from the direction of James Bay. It rapidly extended its influence over sections to the east of the Mississippi with a tendency to move southward, but the morning report of the 25th showed, however, a considerable increase of pressure at northern stations, and a diminution at southern, due, apparently, to the approach of a tropical storm off the south Atlantic. The high area moved slowly to the eastward over New England, apparently serving as a buffer to the cyclone, after the passage of which its course was to the southward along the Atlantic coast. Before its final disappearance off Hatteras its pressure was considerably augmented.

At the time of the appearance of this high area rains fell in the Atlantic States from Maine to Florida, and continued until the approach of the cyclone. The high then assumed ascendancy over the country north of Virginia, maintaining fair weather, notwithstanding the effects of the cyclonic disturbance were plainly visible in the continuous northeast gales which prevailed off the north Atlantic coast from the 25th to the 30th. The conditions during this period afford an interesting example of a dry northeaster.

#### AREAS OF LOW PRESSURE.

The following tables exhibit the principal facts regarding these low areas:

TABLE I.

No.	First observed.			Last observed.			Duration.	Velocity per h'r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Date.	Station.	Reading.
I.....	1	50	97	49	68	3-5	24-0	1	Port Arthur, Ont.....		29-70
II.....	4	56	110	50	66	6-0	20-0	5	Qu'Appelle, N. W. T....		29-62
III.....	11	51	108	48	76	4-6	25-0	14	Kingston, Ont.....		29-62
IV.....	16	53	112	50	89	2-0	22-0	16	Swift Current, N. W. T..		29-56
V.....	18	52	112	50	64	4-6	26-0	20	Port Arthur, Ont.....		29-44
VI.....	27	52	114	50	87	2-0	27-0	27	Qu'Appelle, N. W. T....		29-22
Mean.....		51	109	50	74	3-8	24-0	....	.....		29-53

TABLE II.

Number.	Maximum abnormal fall in pressure in twelve hours.			Maximum abnormal rise in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
I.....	.18	La Crosse, Wis.....	1	6	Chicago, Ill.....	1	44	sw.	3
II.....	.24	Rockliffe, Ont.....	8	13	Rockliffe, Ont.....	8	50	w.	7
III.....	.25	Halifax, N. S.....	15	5	Eastport, Me.....	15	55	sw.	11
IV.....	.28	Saint Vincent, Minn..	19	14	Duluth, Minn.....	20	42	nw.	16
V.....	.34	Fort Custer, Mont....	23	27	Medicine Hat, N.W.T.	22	42	w.	30
VI.....	.32	Qu'Appelle, N. W. T..	27	25	Fort Custer, Mont..	26	32	w.	27

Six areas of low pressure were traced over the United States and the territory to the north during the month of August, and the first well-defined tropical storm of the season made its appearance off the Atlantic coast the latter part of this month.

Five of these low areas were first observed to the northwest of Montana; the other made its appearance north of Minnesota. In addition to these an extensive area of low pressure remained in the southern plateau region throughout the greater part of the month. The paths of all were to the north of the fortieth parallel, and the general direction of movement east of the ninety-seventh meridian was to the eastward. Two of the storms pursued a course but slightly to the east of south till reaching the eastern portion of Colorado, in which locality their movement was greatly retarded for twenty-four hours or

more, after which they took up courses to the northeast which they maintained till north of the line of lakes; thence they moved north of, and parallel to, the valley of the Saint Lawrence. Two of the storms disappeared to the north of the Lake region; three over the Saint Lawrence Valley; and one passed off the New Jersey coast and thence northeastward to Nova Scotia.

I.—On the morning of the 1st this area was central north of Minnesota, with high barometer immediately to the west, and a high area also to the eastward off the coast, which dominated the Atlantic states. This low area pursued a path somewhat to the south of east until the evening of the 2d, it then assumed a course to the northeastward over the Gulf of Saint Lawrence. Its progress was marked by no special features. The rain-area which attended extended southward to Missouri, the amount of precipitation increasing with the movement to the east, but at no time was it excessive until the conjunction of its rain-area with that prevailing in the Atlantic states. Prior to its disappearance to the northeast this low, which had produced but slight wind disturbance in its path, caused southeast velocities of short duration on the New England coast of from twenty to forty-four miles per hour.

II.—This area first appeared north of Montana on the evening of the 4th. It remained in this locality with but slight movement to the eastward until the evening of the 5th, the morning report of the 6th, however, shows the development of a trough extending from northern Dakota southwestward to Utah, with lowest pressure at Rapid City, Dak. Light local rains and high wind velocities over southern Dakota and Nebraska attended the formation of the trough of low pressure. The centre of low remained in practically the same locality until the night of the 7th, the disturbance meanwhile gathering intensity, the winds increasing, a velocity of sixty miles from the west being recorded at Valentine, Nebr., on the morning of the 7th. The rain-area, and amount of precipitation also, having increased. Morning reports of the 8th show the centre of low to have moved rapidly to the northeast over Lake Superior. In its passage north of the Lakes it was attended by occasional heavy rains in Iowa and Wisconsin, and at the time of its disappearance to the northeast the rain-area included New England and the Middle States, and the regions in the Ohio and lower Missouri valleys. This disturbance caused no storm velocities on the Atlantic coast, but high winds prevailed on Lake Ontario during the passage of the centre north of this lake, the winds having apparently increased in force after shifting to the west.

III.—This area appeared to the north of Montana on the evening of the 11th. The barometer throughout the country east of the Rocky Mountains was above the normal at this time, except in the extreme eastern portion of New England, the centre of high barometer being in Ohio. Unusually high wind velocities in the Rocky Mountain districts, with widespread but light rainfalls, marked the appearance of this low, which by the morning of the 13th had moved down over southern Minnesota as a well-defined storm. At this time the light rains had extended over the Lake region eastward to New England, while in the Mississippi Valley occasional heavy rainfalls were reported from Lake Superior to Missouri. The storm gradually gathered intensity in its path to the eastward, the rain-area by the next morning embraced the whole country east of the Mississippi, the storm was defined by the circumscribing isobar of 29.80 inches, the barometric gradient indi-

cated high winds, and it was evident that its progress to the Atlantic coast would be attended by considerable disturbance. The evening report of the 14th showed the storm-centre well defined over the eastern end of Lake Ontario, but the succeeding report revealed that the storm had resolved itself into two distinct disturbances, one of which, moving to the northeast, was central over Montreal, the other, to the southeast, off the New Jersey coast; thereafter these separate storms pursued distinct paths, the general course of both being to the northeast, the New Jersey storm skirting the coast.

IV.—This area was indicated by reports from the regions north of Montana on the evening of the 14th. By the evening of the 25th it had somewhat extended its influence southward, producing light rains and high winds in Colorado. Its general course was to the eastward, the centre of low at no time appearing within the limits of the United States, although its position could be located with much certainty from the character of the isobars. In addition to the precipitation in Colorado, light rains were also caused in northern Dakota and northern Minnesota. High winds were reported in eastern Dakota and western Minnesota on the 17th, but, during the passage of this low to the north of the Lakes, light winds as a rule prevailed. This area disappeared on the 18th to the north of the Lake region.

V.—This area appeared over Montana on the morning of the 18th. It rapidly moved down into northeastern Wyoming and southwestern Dakota, causing high westerly winds with light rain in Wyoming and Colorado, and high easterly winds with rain in Dakota. By the evening of the 19th the rain-area was widespread over the northern Rocky Mountains, the storm having recurved in northwestern Nebraska and slowly taken up a movement to the northeast. During its movement in this direction, high velocities were reported in Dakota, Minnesota, Kansas, Nebraska, and Iowa, and heavy rainfall at Duluth and Saint Paul, Minn., with a widespread area of precipitation attending. On the evening of the 20th the storm was central over Lake Superior, the barometer recording a pressure of 29.44 inches at Port Arthur, Ont., with a steep gradient to the west, producing high westerly winds. During the movement of the storm eastward from this locality storm velocities were generated at a number of the stations on the Lakes. The low area disappeared on the 22d over the Saint Lawrence Valley without having produced high wind on the north Atlantic.

VI.—This area appeared to the northwest of Montana on the evening of the 25th; at this time light rains prevailed in Wyoming and Colorado, which, however, soon gave place to fair weather. Occasional high winds occurred to the south of the low, which, although the centre remained practically stationary, was gradually extending southward, so that by the morning of the 27th the pressure in the upper Missouri valley and northern plateau regions was considerably below the normal. The course of the low was but slightly to the south of east, the centre remaining at all times without the United States. It disappeared when north of Lake Superior. In its advance eastward there was considerable crowding of isobars, and high winds prevailed in the southern quadrants. This low was remarkable for the general absence of precipitation within the region of its influence, notwithstanding its decided character, the barometer reading 29.20 inches on the evening of the 27th when central north of eastern Montana, and the temperature standing very considerably above the normal.

#### NORTH ATLANTIC STORMS FOR AUGUST, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during August, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydro-

graphic Office, Navy Department, and the "New York Herald Weather Service."

Eight depressions have been traced for August, 1889; the average number traced for the corresponding month of the last six years being nine. Of the depressions traced for the



current month but one advanced eastward over the ocean south of the fiftieth parallel; two first appeared east of the twenty-fifth meridian; four are first charted in high latitudes west of the thirty-fifth meridian, to which region they had apparently advanced from or near the coast north of Newfoundland, and one is located off the coast of the United States from the 25th to 27th, inclusive. The movement of the depressions along and north of the trans-Atlantic steamship routes was uniformly eastward, inclining to northeast in the vicinity of the British Isles. The storm of the 25th to 27th off the coast of the United States apparently originated over or north of the Bahamas, and thence moved north of the thirty-fifth parallel where it dissipated. Reports at hand will not admit of accurately defining the paths of the storms that appeared over the Gulf of Mexico and the Caribbean Sea during the latter part of the month, nor of the storm in the west Gulf on the 8th and 9th. On the 19th a depression was indicated south of San Domingo, in which region it apparently remained until the 23d. On the latter date a cyclonic disturbance was apparently central south of Cuba and to the west of Jamaica. On the 24th a disturbance of considerable strength was central off or north of the western extremity of Cuba, after which it apparently moved westward over the Gulf, over the west-central portion of which severe storms were reported until the 27th.

Compared with the corresponding month of previous years the storms that appeared over the north Atlantic Ocean during August, 1889, corresponded closely with the average in number and intensity, although extremely low barometric readings noted for preceding years were not reported. The storms of tropical or sub-tropical origin which appeared over the Caribbean Sea and the Gulf of Mexico, while apparently possessing considerable strength, were not well defined, and reports do not indicate that the depressions reported by West Indian stations moved north of the twenty-fifth parallel. In August of preceding years well-defined storms of destructive violence, averaging about two per month, have moved westward over or near the West Indies, and thence recurved over the Gulf of Mexico or over or off the Atlantic coast states. Storms of great strength have also appeared over the west Gulf. Among notable West Indian and Gulf storms charted and described in the REVIEW for August in preceding years are: 1879, 17th to 19th, storm moved from the Bahamas along the Atlantic coast, attended by gales of hurricane force and unusually high tides. 1880, 12-13th, storm in west Gulf devastated the Texas coast at the mouth of the Rio Grande; 18th, storm at the Island of Jamaica caused loss of life and immense damage to shipping and property; 26th to 31st, storm moved north of the Bahamas, crossed northern Florida 29-30th, strewing the Florida coast with wrecks and doing great damage to property and crops. 1881, 27th, storm moved north of west to the coast, near Savannah, Ga., causing extensive destruction of property and lamentable loss of life. 1885, 23d to 25th, storm moved along east Florida and south Atlantic coasts, causing great destruction on the south Atlantic coast, where the damage was estimated at \$1,500,000. 1886, two severe storms moved north of west over the Caribbean Sea, one recurring north over Cuba and the Bahamas, and the other passing into the Gulf; 19-20th, a terribly destructive storm in the west Gulf; at Indianola, Tex., not a building was left standing, and the barometer fell to about 28.00 (711). 1887, two energetic and destructive storms moved from the vicinity of the Windward Islands, north of the West Indies, to the Bahamas, where they recurved north and northeast. 1888, 16th to 19th, storm moved from the Bahamas to the west Gulf coast, attended by violent squalls and incessant rain.

The following are brief descriptions of the depressions traced over the north Atlantic Ocean for August, 1889:

1.—This depression was central on the 1st in about N. 57°, W. 21°, with central pressure below 29.40 (747). On this date the pressure was low over the entire ocean north of the fiftieth parallel, the presence of a second depression being indicated northeast of Newfoundland in about latitude N. 55°. By the

2d the depression traced had moved northeast to about the fifteenth meridian, after which it disappeared north of the region of observation.

2.—This depression appeared northwest of Ireland on the 4th, and thence moved eastward and disappeared over the British Isles, attended by moderate to fresh gales.

3.—This depression apparently moved eastward from the Labrador coast, and at noon, Greenwich time, of the 6th was central in about N. 57°, W. 39°, whence it passed eastward to the British Isles by the 10th without evidence of marked energy.

4.—This depression advanced eastward from the North American continent north of the region of observation, and on the 13th was apparently central off the southern extremity of Greenland, from which position it passed eastward and disappeared north of the British Isles after the 16th, attended by a gradual decrease in pressure and fresh to strong gales.

5.—This depression was a continuation of low area iii, and on the 16th was central over Newfoundland, with moderate to fresh gales over and west of the Grand Banks. By the 17th the centre of depression had moved eastward to the fortieth meridian, after which it apparently moved rapidly northeastward and united with a depression which occupied the ocean between the British Isles and Iceland.

6.—This depression moved eastward from or north of Newfoundland, and on the 19th was central in about N. 54°, W. 39°, whence it advanced eastward and disappeared over the British Isles after the 21st, attended by moderate to fresh gales.

7.—This depression is first located in N. 57°, W. 40°, under date of the 27th, from which position it moved north of east to the twenty-fourth meridian by the 28th, and thence passed beyond the region of observation, attended throughout by moderate to fresh gales.

8.—This depression apparently originated off the Florida or south Atlantic coasts, and reports admit of locating its centre in about N. 33°, W. 74° on the 25th. By the 26th the storm-centre had moved northeast to the thirty-fifth parallel, and by the 27th had advanced to about the thirty-seventh parallel; after which its location cannot be determined, and it is thought that the depression dissipated on the west edge of an area of high pressure which occupied the ocean to the eastward. A noteworthy feature of this storm was the unusual strength of the gales attending a relatively slight barometric depression. The barometer readings reported near the storm-centre did not fall below 29.90 (759) from the 25th to 28th, inclusive, while after the 25th strong to whole gales, attaining hurricane force on the 27th and 28th, were reported west of the seventieth meridian and between the thirty-fifth and fortieth parallels.

The following telegraphic reports from the Rev. Father Benito Vines, S. J., Director of the Meteorological Observatory of the Royal College of Belen, Havana, Cuba, indicate the meteorological conditions which prevailed at stations in San Domingo, Cuba, and over the east Gulf for several days preceding the appearance of this depression north of the Bahamas. From the 19th to the 22d, inclusive, the barometer at San Domingo was low and falling, a reading of 29.41 (747) being reported on the 22d, after which there was a slight increase in pressure until the 23d, the date of the last report. During this period the wind apparently continued between south and southeast. The reports of the 23d from Santa Clara and Santiago de Cuba indicated the presence of a cyclonic depression south of Cuba, and the observations at Havana of the 23d and 24th showed the presence of a disturbance over the Gulf:

Santiago de Cuba, August 19th, 5.30 p. m.: observations from San Domingo, 5 p. m., barometer 29.57 (751), wind se., strong, cloudy, calm sea. At present, in Havana, there are only observed indications of an anti-cyclone in the first quadrant. Santiago de Cuba, August 20th: observations from San Domingo, 4 p. m. to-day, barometer 29.53 (750), wind s., storm. Santiago de Cuba, August 21, 4 p. m.: observations from San Domingo, 3 p. m., barometer 29.45 (748), wind s., storm. Puerto Plata the same. Havana, August 22d: the latest telegrams received from San Domingo and Puerto Plata apparently indicate that the storm has crossed over the central portion of the island of San Domingo in a northwest direction. In Havana, at present, the lower currents have continued to be apparently anti-cyclonic, moderating in intensity and causing a fall of the barometer, whilst the upper currents indicate a

eyclonic disturbance from the direction of the Gulf. From the east there is nothing upon which to found a probability, and this apparently indicates that the storm referred to by the telegrams is of moderate dimensions, and is still at a great distance. San Domingo, 22d, 5 p. m.: barometer 29.41 (747), wind se., severe storm, sea agitated. San Domingo, 23d, 5 p. m.: barometer 29.45 (748), wind se., light storm, sea calm. Santa Clara, 23d, 6 p. m.: barometer 29.49 (749); during the day cloudy sky, rain at times from ese., and wind very light, variable in the second quadrant, shifting now to ene., complete calm, and plumiform cirrus in small numbers. Havana, 23d, noon: the barometer has continued to fall and the wind has shifted to s. The cyclonic disturbance from the Gulf, which until the present time appeared to be of moderate intensity, has increased somewhat in strength, controlling the lower currents. No indications of a cyclone are observed from the east. Santiago de Cuba, 23d, 3 p. m.: barometer 29.88 (759), barometer this morning 29.98 (762), cloudy, thunder-claps, cloudy to the south. Depression appears to continue sw. or w.  $\frac{1}{2}$  nw. Santiago de Cuba, 24th, 7 a. m.: barometer 29.98 (762), cumulo-stratus from se., cirro-cumulus from s., calm, misty; 3 p. m., barometer 29.93 (760), cumulo-stratus from the s., cirrus from the west, wind s., good weather. Havana, 24th, noon: the barometer has commenced to rise slowly with gusts of wind from the s., sky cloudy, rain and squalls. The greater force of the gusts of wind have been from twenty-seven to thirty-two miles per hour; in the force of the squalls the gusts of wind inclined to sw. The cyclonic disturbance in the Gulf, more intensified and organized, has been slowly receding to the nw. Of the storm in San Domingo up to the present time there have been no indications whatever at Havana.

The following storm warnings were telegraphed from this office preceding and attending the advance of this depression off the Atlantic coast:

WASHINGTON, D. C., August 23, 1889—10.55 P. M.  
Observers, Norfolk, Wilmington, Charleston, Savannah, Jacksonville, Cedar Keys, Jupiter, Mobile, New Orleans, Galveston, Key West:

Reports indicate that a severe storm is approaching Florida from the southeast, although dangerous winds have not occurred at any of the coast stations and conditions of storm are not sufficiently defined to justify the ordering of signals. Further notice will be given should the danger increase.

DUNWOODY.

WASHINGTON, D. C., August 25, 1889—10.55 P. M.  
Observers, New York, Boston, Philadelphia:

Cyclone apparently following course of the Gulf Stream. It will doubtless pass well to the eastward. It is apparently central east of North Carolina.

DUNWOODY.

WASHINGTON, D. C., August 25, 1889.  
Secretary Maritime Exchange, New York; Observer, Boston:

Cyclone apparently central southeast of Hatteras, moving northward. Centre not as yet clearly defined, but warnings stating that it is not safe to sail have been issued to Norfolk. Will communicate further information as received.

DUNWOODY.

WASHINGTON, D. C., August 25, 1889.  
Observers, Norfolk, Norfolk section, Fort Monroe:

Hoist cautionary northeast signals at 11.10 a. m. Storm apparently central southeast of Hatteras, moving northward. Considered dangerous to leave port until further information is received showing more definitely the location of storm. Notice will be telegraphed.

DUNWOODY.

WASHINGTON, D. C., August 25, 1889.  
Observers, Breakwater, Atlantic City, Sandy Hook, Narragansett section, Wood's Holl, Wood's Holl section:

Hoist cautionary northeast 12.40 p. m. Storm central off Hatteras, moving north. Brisk to high northeast winds indicated for middle Atlantic and south New England coasts.

DUNWOODY.

WASHINGTON, D. C., August 26, 1889—9.40 A. M.  
Observers, Narragansett section, Wood's Holl, Wood's Holl section:

9.50 a. m. Change cautionary to storm northeast signals. Cyclone apparently moving northeastward following general course of Gulf Stream; apparently central to the southeast and distant from the coast. Dangerous gales will continue on the southeast New England coast.

DUNWOODY.

WASHINGTON, D. C., August 26, 1889—10 A. M.  
Observers and displaymen, New Haven, New London, Newport section; Boston, Boston section:

Hoist cautionary northeast signals at 10.30 a. m. Storm apparently central to the southeast of New England and distant from the coast, moving northeast. Dangerous gales are indicated for the southeast New England coast to-day.

DUNWOODY.

WASHINGTON, D. C., August 26, 1889—12.10 P. M.  
Observer, New York:

Hoist cautionary northeast signals at 12.30 p. m. Brisk to high northeast winds indicated for the middle Atlantic coast. Cyclone apparently central distant from the coast, moving northeast along the Gulf Stream.

DUNWOODY.

WASHINGTON, D. C., August 26, 1889—12.10 P. M.  
Secretary Maritime Exchange, New York City:

Brisk to high northeast winds indicated for the middle Atlantic coast. Cyclone apparently central distant from the coast, moving northeast along the Gulf Stream.

DUNWOODY.

WASHINGTON, D. C., August 26, 1889—12.10 P. M.  
Observers, Norfolk, Norfolk section, Fort Monroe, Breakwater, Atlantic City, Sandy Hook:

12.15 p. m. Continue signals. Brisk to high northeast winds indicated for the middle Atlantic and southern New England coasts. Cyclone apparently central distant from the coast, moving northeast along the Gulf Stream.

DUNWOODY.

WASHINGTON, D. C., August 27, 1889—12.20 P. M.  
Observers, Norfolk, Norfolk section, Fort Monroe, Breakwater, Atlantic City, Sandy Hook, New York:

12.25 p. m. Continue signals. Storm apparently central off the North Carolina coast. Dangerous northeast winds will continue on the middle Atlantic and New England coasts.

DUNWOODY.

WASHINGTON, D. C., August 27, 1889—12.20 P. M.  
Observers, Narragansett section, Wood's Holl, Wood's Holl section:

12.25 p. m. Change storm to cautionary. Storm apparently central off the North Carolina coast. Dangerous northeast winds will continue on the middle Atlantic and south New England coasts.

DUNWOODY.

WASHINGTON, D. C., August 28, 1889—12.35 P. M.  
Observers, Norfolk section, Norfolk, Fort Monroe, Breakwater, Atlantic City:

12.45 p. m. Continue signals.

DUNWOODY.

WASHINGTON, D. C., August 29, 1889—9.45 A. M.  
Observers, Norfolk section, Norfolk, Fort Monroe, Breakwater, Atlantic City:

9.45 a. m. Signals down.

DUNWOODY.

The following correspondence, by telegraph, was had with Commander G. W. Sumner, commanding the U. S. S. "Galena," relative to the movement of this depression and the storms attending it:

NAVY YARD, BROOKLYN, N. Y., August 24, 1889.

CHIEF SIGNAL OFFICER, Washington, D. C.:

Are the weather conditions along the coast favorable for starting for Hayti?

G. W. SUMNER,

Commander, U. S. N., U. S. S. "Galena."

WASHINGTON, D. C., August 24, 1889.

Commander G. W. SUMNER,

U. S. S. "Galena," U. S. Navy Yard, Brooklyn, N. Y.:

Weather conditions are not favorable; looks like a cyclone off Florida coast. Would advise delay in sailing until further notice.

DUNWOODY,

Acting Chief Signal Officer.

WASHINGTON, D. C., August 24, 1889—10.50 P. M.

Commander G. W. SUMNER,

U. S. S. "Galena," Brooklyn Navy Yard:

From the 8 p. m. reports to-night the conditions are less threatening than they have been during the past two days. The winds are all light on the coast, and the barometer about 30.00 inches at all southern stations. If the West India cyclone continues it is too far distant from the coast to affect land stations. It may, however, be moving northward east of the Gulf Stream.

DUNWOODY,

Acting Chief Signal Officer.

BROOKLYN, N. Y., August 25, 1889.

CHIEF SIGNAL OFFICER, Washington, D. C.:

Your last telegram received. If you have any later information in reference to the cyclone or coast weather please telegraph me at Sandy Hook.

G. W. SUMNER,

Commander U. S. N., U. S. S. "Galena."

WASHINGTON, D. C., August 25, 1889—3 P. M.

Commander G. W. SUMNER, U. S. N.,

U. S. S. "Galena," Sandy Hook, N. J.:

Have ordered warning signals at stations from Hatteras to Boston. Storm is probably dangerous off the middle Atlantic coast; wind at Henry thirty miles; Atlantic City twenty-four miles northeast, increasing.

DUNWOODY.

NOTE.—The "Galena" was signaled off Sandy Hook and this message delivered to her.

WASHINGTON, D. C., August 25, 1889—10.15 A. M.

Commander G. W. SUMNER, U. S. N.,

U. S. S. "Galena," Sandy Hook, N. J.:

The morning report indicates cyclone to the east of Hatteras although winds on coast do not exceed twenty miles at present. I have called for special reports during the day and will be able to telegraph you further information at 3 p. m.

DUNWOODY.

NOTE.—The "Galena" was signaled off Sandy Hook and this message delivered to her.

SANDY HOOK, N. J., August 25, 1889.

CHIEF SIGNAL OFFICER, Washington, D. C.:

All despatches received, many thanks for your kind attention and valuable information.

G. W. SUMNER, Commander, U. S. N.

SANDY HOOK, N. J., August 26, 1889.

CHIEF SIGNAL OFFICER, Washington, D. C.:

U. S. S. "Galena" signals: "Can we sail south?" Answer yes or no.

DELAMOTTE, Manager.



WASHINGTON, D. C., August 26, 1889—9.40 P. M.

To Commander G. W. SUMNER, U. S. N.,  
U. S. S. "Galena," Sandy Hook, N. J.

I do not consider it safe to sail from Sandy Hook to-night. Northeast gales continue off the coast from Hatteras to Nantucket. The force of wind will probably decrease, rendering it safe to sail to-morrow; but would not advise leaving until after Tuesday morning reports. Will telegraph you at 9 a. m., Tuesday.

DUNWOODY,

Acting Chief Signal Officer.

WASHINGTON, D. C., August 27, 1889—9.35 A. M.

To Commander G. W. SUMNER, U. S. N.,  
U. S. S. "Galena," Sandy Hook, N. J.

It is not considered safe to sail south; the morning conditions are more threatening off the middle Atlantic and North Carolina coasts; probably blowing strong northeast gales within one hundred miles of Sandy Hook. Will send special report at 12 m.

DUNWOODY,

Acting Chief Signal Officer.

WASHINGTON, D. C., August 27, 1889—12.30 P. M.

Commander G. W. SUMNER,  
U. S. S. "Galena," Sandy Hook, N. J.:

Not safe to sail from Sandy Hook south to-day. It is blowing a gale off the Virginia coast. Wind thirty-six miles northeast at Henry at 11 a. m.; thirty-two east at Block Island, and twenty-eight northeast at Atlantic City.

DUNWOODY,

Acting Chief Signal Officer.

SANDY HOOK, N. J., August 28, 1889.

CHIEF SIGNAL OFFICER, Washington, D. C.:

"Galena" signals: "Can we sail south; answer yes or no."

Replied: "Do not sail until after next report." Advise.

WM. DELAMOTTE, Manager.

WASHINGTON, D. C., August 28, 1889—9.45 A. M.

Commander G. W. SUMNER,  
U. S. S. "Galena," Sandy Hook, N. J.:

No. Still blowing northeast gale off the Virginia and North Carolina coasts. Wind now thirty-six miles northeast at Cape Henry.

DUNWOODY,

Acting Chief Signal Officer.

WASHINGTON, D. C., August 28, 1889—12.41 P. M.

Observer, Sandy Hook, N. J.:

11 a. m. reports show wind decreasing in force; have called for 2 p. m. reports, and will telegraph the conditions at 3 p. m. It appears now as if it would be safe to sail this evening. Repeat to commander of "Galena."

DUNWOODY,

Acting Chief Signal Officer.

WASHINGTON, D. C., August 28, 1889—3 P. M.

Commander G. W. SUMNER,  
U. S. S. "Galena," Sandy Hook, N. J.:

2 p. m. reports show wind decreasing in force. Safe to sail south to-night.

DUNWOODY,

Acting Chief Signal Officer.

#### FOG IN AUGUST.

The following are limits of fog-areas on the north Atlantic Ocean during August, 1889, as reported by shipmasters:

Date.	Entered.			Cleared.			Date.	Entered.			Cleared.		
	Lat. N.	Lon. W.		Lat. N.	Lon. W.			Lat. N.	Lon. W.		Lat. N.	Lon. W.	
1	36 05	39 58		55 56	41 08		16	44 40	52 04		44 30	52 39	
1-2	43 42	48 40		42 47	54 39		16	45 58	51 00		46 30	49 02	
2				46 53	51 57		16-17	52 45	51 30		52 15	54 00	
3	53 06	49 12		51 40	56 14		16-17	43 20	52 53		43 14	54 23	
3-4	52 35	52 25		53 35	49 00		16-17	46 55	52 08		43 24	50 20	
3-4	48 53	46 37		43 44	57 38		16-17	43 58	52 31		43 00	60 48	
4	50 50	58 00		49 30	60 30		17	43 07	50 38		43 20	56 10	
4-5	42 13	58 01		42 15	59 50		17-18	46 37	52 12		45 10	54 40	
4-5	44 56	46 05		43 50	49 58		18	52 10	54 30		53 10	50 20	
5	50 15	45 39		49 15	47 15		18-19	45 24	45 28		44 58	47 18	
6	48 12	42 51		45 23	52 19		20	43 30	50 30		43 50	48 00	
6-7	46 24	45 05		47 00	42 21		20-21	40 53	68 00		40 47	69 40	
7	52 00	53 40		Cape Bauld, N. F.			22	47 52	48 40		49 52	43 58	
8	42 50	64 45		42 40	65 45		22	41 41	69 41		40 43	69 45	
8-9	46 19	48 21		47 20	50 43		22-23	53 53	47 53		52 35	52 22	
9	46 52	51 33		45 45	54 02		24-25	49 06	43 03		46 21	53 42	
11	42 41	64 00		42 34	66 30		24	46 25	52 16		46 05	52 57	
11-12	45 07	49 00		44 28	51 45		24	280 miles from	180 miles from				
11-12	45 00	52 10		47 45	43 19			Boston Light.	Boston Light.				
12-13	46 51	45 11		45 59	53 03		25	52 00	45 00		52 00	48 00	
13	46 06	48 08		45 06	43 19		30	43 47	68 30		43 22	68 40	
13-14	45 45	55 30		Off Cape Pine.			30-31	41 07	66 44		40 47	68 45	
13-14	40 45	68 31		40 40	68 59		31	45 55	49 16		45 48	49 38	

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of Newfoundland and the Grand Banks fog was reported on twenty-two dates, as compared with eighteen dates for July, 1889, and

twenty-two dates for August, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on six dates, as compared with ten dates for July, 1889, and thirteen dates for August, 1888. West of the sixty-fifth meridian fog was reported on nine dates, as compared with eleven dates for July, 1889, and nine dates for August, 1888. Compared with the preceding month there has been a decrease in fog-frequency, the decrease being most marked east of the fifty-fifth meridian. Over and near the Grand Banks fog was reported with southerly winds, and low barometric pressure to the northward, except on the 7th, 8th, and 25th, when unsettled weather and high barometer prevailed. On twelve dates fog was reported off the northern coast of Newfoundland, in the region in which ice was most frequently reported during the month. Between the fifty-fifth and sixty-fifth meridians fog was reported with the approach or passage to the northward of areas of low pressure, except on the 8th, when variable winds, high barometer, and unsettled weather prevailed. West of the sixty-fifth meridian fog was reported with southerly to easterly winds and unsettled weather.

#### OCEAN ICE IN AUGUST.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for August during the last eight years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
August, 1882	46 50	46 00	August, 1882	46 50	46 00
August, 1883	43 26	51 41	August, 1883	48 00	44 00
August, 1884	43 24	48 44	August, 1884	47 50	43 50
August, 1885	43 48	52 04	August, 1885	48 03	42 45
August, 1886	46 35	48 46	August, 1886	50 00	48 00
August, 1887	42 21	49 51	August, 1887	48 06	40 00
August, 1888			August, 1888	51 53	55 00
August, 1889	43 34	48 38	August, 1889	53 00	45 00

\* Straits of Belle Isle. † Isolated field ice in N. 58°, W. 40°.

In August, 1889, the southernmost ice reported, which consisted of a few small pieces of ice, was about two and one-half degrees south of the average southern limit, and the easternmost ice noted, an iceberg, was about one degree east of the average eastern limit of ice for the month. Ice was most frequently reported from Belle Isle eastward to the fiftieth meridian; it was reported south of the fiftieth parallel on four dates only, and no icebergs or field ice were reported off the coast of Newfoundland south of the forty-ninth parallel, save along the extreme eastern edge of the Grand Banks. Compared with ice reported for July, 1889, a marked deficiency is shown, except in and east of the Straits of Belle Isle; the extreme southern limit has contracted about one degree, while the eastern limit, north of the fiftieth parallel, has extended about two degrees. Compared with the corresponding month of preceding years no unusual features are presented in connection with the quantity or distribution of Arctic ice for the current month.

The following positions of icebergs and field ice reported are shown on chart i by ruled shading:

1st.—N. 52° 00', W. 54° 47' to Belle Isle, fifty large bergs; from Belle Isle to Point Amour, over two hundred large bergs; N. 48° 54', W. 48° 56', a large berg.

2d.—N. 51° 07', W. 57° 40', small bergs, increasing in size in the Straits of Belle Isle; off Point Piche, off Belle Isle, and in the Straits, numerous large bergs; N. 46° 47', W. 48° 00', one large and two small bergs.

3d.—N. 52° 59', W. 50° 58' to N. 51° 34', W. 56° 27', on the 5th, numerous large bergs, and numerous large bergs in the Straits of Belle Isle; N. 52° 53', W. 52° 02' to 20' east of Point Amour, upwards of three hundred bergs, several of them of enormous size; N. 52° 59', W. 51° 39' to Straits of Belle Isle, large and medium-sized bergs in great numbers.

7th.—N. 53° 04', W. 50° 45', one large berg, and from this

position to Belle Isle the sea was thickly studded with large and small bergs. In the Straits of Belle Isle counted forty-seven bergs, mostly packed in the east portion of the straits, and gradually becoming fewer towards Point Amour.

8th.—N. 52° 50', W. 50° 29', large bergs and small broken ice; N. 53° 17', W. 51° 30' to Cape Norman, numerous large and small bergs right in the track of steamers bound through Straits of Belle Isle.

9th.—N. 51° 30', W. 56° 20', large and small bergs.

14th.—N. 53° 27', W. 50° 14' to Cape Norman, large icebergs.

16th.—N. 52° 11', W. 49° 48' to Belle Isle, large bergs.

17th.—Off Point Amour, three large bergs.

18th.—Off Belle Isle, five large bergs; N. 49° 52', W. 54° 07', one large and one small berg; Point Amour to N. 52° 11', W. 53° 52', numerous very large bergs.

19–20th.—Straits of Belle Isle to N. 52° 30', W. 51° 50', a number of bergs, some large.

20th.—N. 43° 34', W. 48° 38', a few small pieces of ice.

22d.—N. 53° 10', W. 50° 04', a large berg, and from that position to Cape Norman, several bergs of various sizes; off Cape Norman, numerous bergs.

23d.—N. 52° 34', W. 52° 30', numerous bergs.

24th.—N. 52° 25', W. 52° 25' to Belle Isle, a number of bergs; in the Fairway, five hundred and seven miles east of Belle Isle, two large bergs aground, saw them in same position last voyage; N. 55° 15', W. 53° 30', four large bergs; N. 58°, W. 40°, a large field of ice; N. 53°, W. 45° to N. 48°, W. 50°, 24th to September 1st, numerous bergs.

25th.—N. 52° 06', W. 48°, large berg about one hundred and fifty feet high; N. 52° 50', W. 51° 26', several small bergs; N. 53° 15', W. 52°, one large berg.

26th.—Straits of Belle Isle clear of ice from Belle Isle to N. 53° 16', W. 51°, where there were numerous bergs large and small; N. 51° 23', W. 50° 40', three large bergs.

### TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for August, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

In August, 1889, the mean temperature was highest in the lower valley of the Colorado River, where, at stations in southern Nevada and adjoining parts of Arizona and California, the values rose above 95°, the highest mean reading, 102°·5, being reported at Volcano Springs, Cal. In San Bernardino, the southeastern part of Inyo, and the eastern half of San Diego counties, Cal., southern Nevada, and a considerable portion of southern and western Arizona, the mean temperature was above 90°. The mean readings were above 85° in the Rio Grande Valley, and were above 80° over western Florida, at stations south of a line traced irregularly westward from southern Georgia to Arizona, and in areas in northern Utah, central Kansas, and the valleys of the Sacramento and San Joaquin rivers, Cal. The lowest mean temperature of the month was reported at stations in Lake Co., Colo., along the California coast north of San Francisco, and in the lower Saint Lawrence valley, where it fell to or below 55°. The mean temperature was below 60° along the immediate Pacific coast from San Francisco, Cal., to the British Possessions, central and north-central Colorado, north of a line traced irregularly eastward from the northern coast of Lake Superior to the lower Saint Lawrence valley, and at coast stations in eastern Maine and western Nova Scotia.

The mean temperature was generally below the normal in the Saint Lawrence Valley and the Canadian Maritime Provinces, and from the Atlantic coast states westward south of the Lake region to the middle, eastern, and southeastern slopes of the Rocky Mountains, in the valley of the Columbia River, and at Los Angeles, Cal. Over the upper lakes and thence westward to the valley of the Columbia River, in the Rocky Mountain and plateau regions, and along the middle and southern Pacific coast the month was generally warmer than the average August. The most marked departures below the normal occurred in the Saint Lawrence Valley, southwestern Maine, from central Virginia to the south Atlantic coast, over the southern extremity of Florida, in central Arkansas and northwestern Louisiana, north-central Kentucky, and central

Tennessee, where they equalled or exceeded 3°. The greatest departures above the normal were noted in the British Possessions north of Montana, and in Arizona, where they were more than 5°. Considered by districts, the greatest average departure below the normal temperature occurred in the Florida Peninsula, where it was 2°·7; in the Ohio Valley and Tennessee the average departure below the normal temperature was 2°·5; in the south Atlantic and west Gulf states, 2°·2; in the east Gulf states, 2°·1; in the middle Atlantic states and the southeastern slope of the Rocky Mountains, 1°·8; on the north Pacific coast, 1°·2; in the lower lake region and the upper Mississippi valley, 1°·1; in New England, 1°·0, and in the northern plateau region, 0°·7. The greatest average departure above the normal, 3°·6, occurred in the southern plateau region; in the middle plateau region the average departure above the normal was 2°·1; in the extreme northwest, 2°·0; in the middle eastern slope of the Rocky Mountains, 1°·4; in the northeastern slope of the Rocky Mountains, 1°·2; on the middle Pacific coast, 1°·1; in the upper lake region, 0°·9; in the Missouri Valley, 0°·5, and on the south Pacific coast, 0°·2. In the Rio Grande Valley the mean temperature averaged normal.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Whipple Barracks (Prescott), Ariz....	7·4	Father Point, Quebec.....	4·0
Medicine Hat and Qu'Appelle, N.W.T.	6·0	Key West, Fla.....	3·8
Santa Fé, N. Mex.....	3·0	Lynchburg, Va.....	3·6
Denver, Colo.....	2·8	Portland, Me.....	3·4
Salt Lake City, Utah.....	2·4	Little Rock, Ark.....	3·2

### DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for August, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for August during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Aug.			
						Highest.	Year.	Lowest.	Year.
Arkansas.									
Lead Hill .....	Boone .....	77·9	7	77·1	—0·8	81·0	1886	75·5	1882



## Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Aug.			
						Highest.	Year.	Lowest.	Year.
California.		°	Years	°	°	°		°	
Sacramento .....	Sacramento .....	71.6	36	67.1	-4.5	76.0	1866	66.2	1887
Oroville .....	Oroville .....	76.6	20	77.1	+0.5	81.2	1881	72.4	1870
Fort Lyon .....	Bent .....	76.6	20	77.1	+0.5	81.2	1881	72.4	1870
Connecticut.									
Middletown .....	Middlesex .....	74.7	17	66.4	-8.3	73.0	1870	65.9	1861
Florida.									
Merritt's Island .....	Brevard .....	80.7	5	78.8	-1.9	81.5	1888	78.8	1889
Georgia.									
Forayth .....	Monroe .....	78.9	15	77.4	-1.5	82.4	1878	73.2	1885
Illinois.									
Peoria .....	Peoria .....	75.6	33	73.4	-2.2	80.5	1881	70.1	1866
Riley .....	McHenry .....	68.8	33	68.1	-0.7	73.4	1867	64.1	1885
Indiana.									
Veray .....	Switzerland .....	75.1	23	72.4	-2.7	80.7	1881	69.9	1875
Iowa.									
Cresco .....	Howard .....	69.2	16	69.1	-0.1	72.6	1881	63.1	1885
Monticello .....	Jones .....	70.1	35	69.7	-0.4	77.1	1861	64.3	1863
Logan .....	Harrison .....	73.7	15	72.4	-1.3	79.6	1881	68.2	1875
Kansas.									
Lawrence .....	Douglas .....	75.5	21	72.7	-2.8	83.4	1874	71.1	1884
Wellington .....	Sumner .....	70.6	10	76.5	+0.1	82.6	1881	70.1	1884
Louisiana.									
Grand Coteau .....	Saint Landry .....	82.1	6	78.9	-3.2	83.6	1883	78.9	1889
Maine.									
Gardiner .....	Kennebec .....	66.4	49	*	.....	71.5	1840	62.5	1866
Maryland.									
Cumberland .....	Allegany .....	69.8	30	69.2	-0.6	75.7	1871, '72	63.6	1866
Massachusetts.									
Amherst .....	Hampshire .....	67.3	53	65.1	-2.2	71.6	1872	63.5	1866
Newburyport .....	Essex .....	67.0	11	65.3	-1.7	69.5	1882	65.3	1889
Somerset .....	Bristol .....	71.7	17	70.5	-1.2	75.0	1877	68.6	1874
Michigan.									
Kalamazoo .....	Kalamazoo .....	69.5	12	68.7	-0.8	73.0	1881	63.8	1885
Thornville .....	Lapeer .....	69.6	12	69.9	+0.3	74.5	1881	64.7	1885
Minnesota.									
Minneapolis .....	Hennepin .....	68.0	24	69.9	+1.9	72.3	1881	63.8	1885
Montana.									
Fort Shaw .....	Lewis & Clarke .....	64.8	19	65.5	+0.7	69.8	1882	53.7	1873
New Hampshire.									
Hanover .....	Grafton .....	65.8	43	63.8	-2.0	70.4	1881	59.2	1885
New Jersey.									
Moorestown .....	Burlington .....	72.1	26	69.9	-2.2	76.1	1864	68.1	1883
South Orange .....	Essex .....	70.9	18	68.1	-2.8	74.5	1877	68.1	1883, '89
New York.									
Cooperstown .....	Otsego .....	65.7	35	62.4	-3.3	71.5	1877	61.0	1861
Palermo .....	Oswego .....	67.0	29	63.6	-3.4	71.6	1877	61.6	1885
North Carolina.									
Lenoir .....	Caldwell .....	73.6	16	70.4	-3.2	77.0	1877	70.4	1874, '89
Ohio.									
Nth Lewisburgh .....	Champaign .....	70.7	57	70.8	+0.1	75.0	1880	64.0	1876
Wauseon .....	Fulton .....	69.5	19	68.0	-1.5	72.8	1872	63.0	1870
Oregon.									
Albany .....	Linn .....	65.7	10	63.2	-2.5	68.7	1888	62.5	1881
Eola .....	Polk .....	64.9	19	63.9	-1.0	68.6	1870	61.2	1881
Pennsylvania.									
Dyberry .....	Wayne .....	64.6	21	61.2	-3.4	68.3	1872	58.4	1866
Grampian Hills .....	Clearfield .....	67.7	25	65.8	-1.9	73.1	1881	62.1	1866
Wellborough .....	Tioga .....	66.4	10	62.3	-4.1	71.3	1881	62.3	1889
South Carolina.									
Statesburgh .....	Sumter .....	77.4	8	73.5	-3.9	79.7	1881	73.5	1889
Tennessee.									
Austin .....	Wilson .....	78.9	18	75.8	-3.1	84.6	1881	75.8	1889
Milan .....	Gibson .....	76.2	6	74.5	-1.7	78.1	1887	73.4	1883
Texas.									
New Uln .....	Austin .....	82.5	17	81.1	-1.4	84.4	1873	79.4	1879, '82
Vermont.									
Stratford .....	Orange .....	67.7	16	65.9	-1.8	72.6	1884	63.9	1885
Virginia.									
Bird's Nest .....	Northampton .....	76.7	21	74.4	-2.3	80.1	1877, '78	65.3	1871
Wisconsin.									
Madison .....	Dane .....	69.1	17	70.0	+0.9	72.2	1878	64.2	1885
Washington.									
Fort Townsend .....	Jefferson .....	61.5	16	59.2	-2.3	64.3	1874	58.9	1876

\* Report not received.

The above table shows that at Middletown, Conn., with a broken record of seventeen years, the mean temperature for the current month was 1° 7 above the highest mean reported for the corresponding month of previous years, noted in 1870. Unusually low mean temperatures are not shown by this table.

## MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported at regular stations of the Signal Service was noted within an area extending from the lower Colorado and Gila valleys northward to the upper San Joaquin valley, where the values rose to or above 110°. The highest reading, 115°, being registered at Fort McDowell, Ariz. In the plateau regions from the middle valley of the Snake River southward, in the Sacramento and San Joaquin Valleys, from the Missouri Valley in Dakota westward to south-central Montana, and from the Rio Grande River north-

ward over the western half of Texas to central Indian Territory the maximum temperature rose to or above 100°. The lowest maximum temperatures were reported on the coast of northern California, where they fell to or below 70°. Along the immediate Pacific coast north of San Francisco, and at stations on the southeast and east New England coast the maximum temperature was below 80°. One station, Fort Assiniboine, Mont., with a record of ten years, reported the highest absolute temperature noted at that place for August, the reading for the current month, 99°, being one degree above that of August, 1882, while at Fort Sully, Dak., thirteen years record, the maximum temperature corresponded with the highest maximum noted for two or more preceding years. Reports of the older established Signal Service stations show that the highest temperature recorded for August was generally noted in the Ohio Valley and Tennessee, northern Louisiana, Arkansas, lower Michigan, northern Ohio, Virginia, Maryland, eastern Pennsylvania, and New Jersey in 1881; in eastern New York and western Connecticut in 1888; in eastern Georgia in 1878; in Alabama and along the southwest coast of Lake Michigan in 1874; in the Rio Grande Valley in 1877; in Indian Territory, northern Texas, and south-central Kansas in 1888; in adjoining parts of Iowa, Illinois, and Wisconsin in 1887; in northern Minnesota in 1886; and in Washington Territory in 1885; elsewhere the periods of occurrence were irregular. The following are maximum readings in the several states and territories where maximum temperature of 100°, or over, was reported for August, 1889, as shown by reports of United States army post surgeons and state weather service and voluntary observers: Fort McDowell, Ariz., 117°; Volcano Springs, Cal., 126°; Fort Lyon, Colo., 106°; Steele, Dak., 110°; Andersonville, Ga., 108°; Boise Barracks, Idaho, 100°; Fort Sill, Ind. T., 104°; Blakeville, Iowa, 104°; Minneapolis, Kans., 110°; Murray, Ky., 100°; Cameron, La., 101°; Montevideo, Minn., 100°; Lamont, Mo., 102°; Powder River, Mont., 110°; Fort Sidney, Nebr., 106°; El Dorado Canyon, Nev., 117°; Deming, N. Mex., 109°; Georgetown, Ohio, 100°; Fort Hancock, Tex., 110°; Saint George, Utah, 111°; Haywood and Wauzeka, Wis., 102°; Fort Laramie, Wyo., 102°. Among extremely high temperatures reported for August in preceding years by United States army post surgeons are, 121° at Fort Boise, Idaho, in 1871, and 119° at Fort Mojave, Ariz., in 1875. Among high temperatures for August at Signal Service stations, other than those given in the table of miscellaneous meteorological data, are 115° at Fort Lapwai, Idaho, in 1882; 110° at Umatilla, Oregon, in 1882; 98° at Delaware Breakwater, Del., in 1885, and 97° at Burlington, Vt., in 1876.

The only regular stations of the Signal Service reporting minimum temperature of 32°, or below, excepting Mount Washington, N. H., where 28° were registered, were Saint Vincent, Minn., Fort Klamath and Linkville, Oregon, where 32°, 24°, and 32°, respectively, were noted. The reports of United States Army post surgeons and state weather service and voluntary observers show that the temperature fell to 25° at Breckenridge, Colo., 31° at Grayling, Mich., 32° at Fort Logan, Mont., and 29° at Fort Bridger, Wyo. The temperature fell below 40° in the valley of the Red River of the North, over a greater portion of Wyoming and southwestern Montana, and within an area extending from central and eastern Oregon southward over northwest Nevada. The minimum values were below 50° in south-central New Mexico, the upper Ohio valley, and north of a line traced irregularly south of west from the Maine coast to east-central California. Along the immediate Pacific coast the minimum temperature fell to or below 50° from San Francisco, Cal., northward. At the following-named stations the minimum temperature was as low or lower than previously recorded for August during the periods of observation: Portland, Me., eighteen years record, 0° 5 below minimum of 1885 and 1887; Jacksonville, Fla., eighteen years record, 1° below minimum of 1886; Key West, Fla., nineteen years record, 1° below minimum of 1888; at Cedar Keys, Fla.,

ten years record, Galveston, Tex., nineteen years record, Chattanooga, Tenn., eleven years record, Escanaba, Mich., sixteen years record, and Neah Bay, Wash., five years record, the same as minimum of two or more preceding years. At Fort Klamath, Oregon, five years record, the minimum was the same as that of 1887. In eastern Pennsylvania, south-eastern New York, and western Connecticut the lowest temperature reported for August by Signal Service stations was generally noted in 1885; in Maryland and the District of Columbia in 1874; in the upper Ohio valley, south-central Virginia, northern Georgia, southeastern Minnesota, and southwestern Wisconsin in 1887; on the South Carolina and Georgia coasts in 1879; on the middle Gulf coast and in the Rio Grande Valley in 1884; in west-central Minnesota and northwestern Dakota in 1886; and in adjoining parts of Nebraska, Wyoming, and Colorado in 1876. In all other sections the periods of occurrence were irregular.

#### RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred in the lower valley of the Red River of the North, whence they decreased eastward to less than 30° at Erie, Pa., and along the New England and middle Atlantic coasts; southeastward and southward to less than 20° on the North Carolina and east and middle Gulf coasts; and southwestward and westward to less than 30° along the immediate Pacific coast. At Fort Klamath, Oregon, the monthly range exceeded 60°.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
Saint Vincent, Minn.....	63.0	Hatteras, N. C.....	17.0
Fort Klamath, Oregon.....	63.0	Port Eads, La.....	18.0
Fort Sully, Dak.....	59.0	Key West, Fla.....	19.0
Fort Du Chesne, Utah.....	59.0	Nantucket, Mass.....	21.0
Wilcox, Ariz.....	53.0	Eureka, Cal.....	22.0

#### FROST.

The following are the only reports of frost injurious to vegetation during August, 1889:

Galena, Ill.: the low grounds in this section were visited by frost on the morning of the 1st, which did considerable

damage to vegetables. Tobacco was also severely injured.—*Union and Advertiser, Rochester, N. Y., August 2.*

Grand Rapids, Wis.: this section was visited by severe frost during the night of the 4-5th, which destroyed a great portion of the cranberry crop.—*Milwaukee, Wis., Journal, 6th.*

Linkville, Oregon: heavy frost occurred on the morning of the 19th, causing considerable damage to vegetables.—*Report of Signal Service observer.*

In the preceding month the only report of frost injurious to vegetation was received from the voluntary observer at Coulter, Colo. Reports of preceding years show that heavy frost in the United States is unusual during July and August, and that the first killing frosts generally occur in northeastern Dakota, central and northern Minnesota, and the more northern parts of Wisconsin and Michigan, where their average date of occurrence is about September 1st.

For August, 1889, light frost was reported in New England, New York, northern Pennsylvania, northeastern Ohio, northern Indiana, Michigan, Wisconsin, northeastern Iowa, in the valley of the Red River of the North, north-central Colorado, southwestern Dakota, central Montana, northern and southeastern Idaho, Utah, and Nevada. No frost was reported south of the fortieth parallel in districts lying east of the Rocky Mountains, nor on the Pacific coast, save at Linkville, Oregon.

#### TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for August, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass.....	66.5	57.0	9.5	62.6	67.4
Canby, Fort, Wash.....	65.5	55.0	10.5	61.4	57.6
Cedar Keys, Fla.....	88.7	80.9	7.8	85.6	80.4
Charleston, S. C.....	84.7	79.0	5.7	81.6	78.0
Eastport, Me.....	53.0	49.8	3.2	51.5	60.3
Galveston, Tex.....	88.0	81.0	7.0	85.1	81.5
Key West, Fla.....	86.2	79.3	6.9	84.5	82.1
Nantucket, Mass.....	74.5	70.5	4.0	72.7	67.4
New York City.....	72.4	69.0	3.4	70.0	71.5
Portland, Oregon.....	77.9	68.0	9.9	71.4	64.8

#### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for August, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In August, 1889, the precipitation was very irregularly distributed and was greatest in areas in extreme southeastern Massachusetts, south-central North Carolina, north-central and south-central Florida, north-central Georgia, and extreme southeastern Nebraska, where it exceeded ten inches, the greatest amounts reported in the several localities referred to being: 11.05, at Nantucket, Mass.; 11.89, at Florence, N. C.; 14.02, at Live Oak, Fla.; 15.56, at Diamond, Ga., and 12.10 at Tecumseh, Nebr. At stations in southeastern New England, southeastern New York, central New Jersey, southeastern Pennsylvania, eastern Virginia, south-central and eastern North Carolina, east-central, southern, north-central, and western Florida, east-central Alabama, southern Mississippi, south-

eastern Louisiana, along the Texas coast, in northeastern Arkansas, south-central and eastern Tennessee, northeastern Minnesota, southwestern Wisconsin, southwestern Iowa, northeastern Kansas, southeastern Nebraska, north-central and south-central Indian Ter., on the extreme north Pacific coast, and at Curtis, Ariz., the rainfall exceeded five inches. Along the California coast between San Francisco and Los Angeles, and thence northward in the valley of the Sacramento River to northern California, and northeastward to north-central Nevada no precipitation was reported for the month. At stations from the northwest coast of Lake Ontario to the southwest coast of Lake Michigan, in the central Ohio and upper Mississippi valleys, southwestern Arkansas, central and western Texas, the northeastern slope of the Rocky Mountains, the plateau regions, save in areas in the middle and southern plateau, and along the Pacific coast south of the forty-second parallel the precipitation was less than one-half inch.

The precipitation for August, 1889, was generally above the normal from southeastern New York to and along the Saint Lawrence Valley to the Gulf, on the south-central New England coast, in southern Florida, the interior of the south Atlantic and east Gulf states, along the west Gulf coast, in eastern and southwestern Tennessee, eastern Kansas, western Missouri, northern Indian Ter., the southern California



coast, and the Pacific coast north of the fortieth parallel and thence southeastward to northern Utah; elsewhere the precipitation was generally below the normal. The greatest departures above the normal occurred in east-central Georgia, extreme southern Florida, northeastern Minnesota, eastern Kansas, and along the coast of Washington Ter., where they exceeded three inches, and amounted to 4.54 at Key West, Fla., 4.57 at Duluth, Minn., and 4.19 at Neah Bay, Wash. The most marked departures below the normal were noted in eastern Maryland, on the east Gulf coast, in the middle Ohio valley, east-central Iowa, southeastern Dakota, and south-central New Mexico, where they were more than three inches; the greatest deficiency, 3.89, being reported at Mobile, Ala. In districts where the precipitation was in excess the average percentages of the normal were about as follows: Florida Peninsula, 106 per cent.; Rio Grande Valley, 135 per cent.; middle-eastern slope of the Rocky Mountains, 109 per cent.; north Pacific coast, 265 per cent.; middle Pacific coast, 160 per cent. In districts where the precipitation was deficient the average percentages of the normal were about as follows: New England, 92 per cent.; middle Atlantic states, 71 per cent.; south Atlantic states, 94 per cent.; east Gulf states, 91 per cent.; west Gulf states, 85 per cent.; Ohio Valley and Tennessee, 67 per cent.; lower lake region, 38 per cent.; upper lake region, 62 per cent.; extreme northwest, 44 per cent.; upper Mississippi valley, 53 per cent.; Missouri Valley, 80 per cent.; northeastern slope of the Rocky Mountains, 55 per cent.; southeastern slope of the Rocky Mountains, 53 per cent.; southern plateau region, 39 per cent.; middle plateau region, 45 per cent.; northern plateau region, 62 per cent.; middle Pacific coast, 33 per cent.

In the following-named districts the rainfall for July, 1889, was excessive, while for the current month it was deficient: New England, the middle and south Atlantic states, the east and west Gulf states, the upper lake region, upper Mississippi valley, northeastern slope of the Rocky Mountains, and the southern plateau region. In the Florida Peninsula, Rio Grande Valley, middle eastern slope of the Rocky Mountains, and the northern and middle Pacific coast there was a deficiency in July and an excess of rainfall in August, 1889. In the Ohio Valley and Tennessee, the lower lake region, extreme northwest, Missouri Valley, southeastern slope of the Rocky Mountains, the northern and middle plateau regions, and the south Pacific coast the precipitation was below the normal for the current and the preceding month. Among the more notable features of August, 1889, were the great excess of rainfall on the north Pacific coast, where more than two and one-half times the usual amount of rain for August fell, and the marked deficiency in the lower lake region, the southern and middle plateau regions, the northeastern slope of the Rocky Mountains, and the south Pacific coast, where less than one-half the normal amount of rainfall for the month was reported.

#### DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for August, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for August during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of Aug.	(2) Length of record.	(3) Total for Aug., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for August.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		Inches	Years	Inches	Inches.	Inches		Inches.	
Lead Hill.....	Boone.....	6.26	7	4.65	-1.61	11.53	1888	3.91	1886
California.									
Sacramento.....	Sacramento.	T.	39	0.00	-T.	0.08	1864	0.00	*

#### Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Aug.	(2) Length of record.	(3) Total for Aug., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for August.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Colorado.		Inches	Years	Inches	Inches.	Inches		Inches.	
Fort Lyon.....	Bent.....	1.88	19	1.06	-0.82	4.92	1880	0.23	1873
Connecticut.									
Middletown.....	Middlesex...	5.44	27	5.12	-0.32	10.22	1867	1.16	1865
Florida.									
Merritt's Island.	Brevard.....	6.57	11	6.95	+0.38	15.77	1880	1.15	1883
Georgia.									
Forsyth.....	Monroe.....	4.76	15	5.50	+0.74	7.46	1879	2.50	1888
Illinois.									
Peoria.....	Peoria.....	3.12	33	1.23	-1.89	9.04	1862	0.57	1883
Riley.....	McHenry.....	4.11	38	0.77	-3.34	15.73	1850	0.77	1889
Iowa.									
Logansport.....	Cass.....	3.21	15	1.67	-1.54	6.30	1886	0.67	1881
Vevay.....	Switzerland..	3.38	24	0.02	-3.36	10.90	1879	0.02	1889
Kansas.									
Cresco.....	Howard.....	3.32	16	0.92	-2.40	8.34	1884	0.92	1889
Monticello.....	Jones.....	3.98	24	0.22	-3.76	8.54	1885	0.22	1889
Logan.....	Harrison.....	4.52	22	3.14	-1.38	8.40	1873	0.80	1882
Kentucky.									
Lawrence.....	Douglas.....	3.57	24	8.38	+4.81	9.07	1888	0.09	1882
Wellington.....	Sumner.....	2.92	10	3.91	+0.99	5.15	1888	0.61	1885
Louisiana.									
Grand Coteau....	St. Landry..	3.54	6	5.13	+1.59	8.07	1888	0.42	1883
Maine.									
Gardiner.....	Kennebec....	3.65	49	†	.....	8.49	1867	0.19	1876
Maryland.									
Cumberland.....	Allegany....	3.15	18	1.52	-1.63	8.09	1882	0.31	1881
Massachusetts.									
Amherst.....	Hampshire..	4.43	53	3.16	-1.27	12.13	1896	0.25	1882
Newburyport.....	Essex.....	3.60	11	2.89	-0.71	7.57	1887	0.75	1883
Somerset.....	Bristol.....	4.17	17	6.19	+2.02	8.08	1880	0.58	1882
Michigan.									
Kalamazoo.....	Kalamazoo..	2.86	13	0.31	-2.55	8.94	1885	0.31	1889
Thornville.....	Lapeer.....	3.23	12	0.35	-2.88	6.69	1877	0.35	1889
Minnesota.									
Minneapolis.....	Hennepin....	3.85	23	2.39	-1.46	11.64	1869	0.47	1883
Montana.									
Fort Shaw.....	Lewis & Clarke	0.80	19	0.00	-0.80	3.01	1876	0.00	'71, '89
New Hampshire.									
Hanover.....	Grafton.....	3.71	44	1.78	-1.93	9.46	1849	0.12	1854
New Jersey.									
Moorestown.....	Burlington..	4.59	26	5.50	+0.91	9.44	1882	0.81	1881
South Orange.....	Essex.....	5.37	18	4.69	-0.68	12.55	1875	1.10	1886
New York.									
Cooperstown.....	Otsego.....	3.87	35	2.13	-1.74	9.46	1896	0.63	1876
Palermo.....	Oswego.....	2.60	35	1.20	-1.40	6.40	1864	0.41	1866
North Carolina.									
Lenoir.....	Caldwell....	5.77	17	4.20	-1.57	10.20	1886	2.10	1877
Ohio.									
N. Lewisburgh..	Champaign..	3.75	17	1.55	-2.20	7.55	1882, '85	0.80	1884
Wauseon.....	Fulton.....	2.88	17	1.54	-1.34	4.86	1886	1.12	1884
Oregon.									
Albany.....	Linn.....	0.44	10	1.18	+0.74	1.62	1881	0.00	'85, '88
Eola.....	Polk.....	0.38	20	1.39	+1.01	1.81	1879	0.00	*
Pennsylvania.									
Dyberry.....	Wayne.....	3.76	17	2.85	-0.91	8.77	1885	0.95	1883
Grampian Hills..	Clearfield...	4.25	19	4.00	-0.25	8.19	1888	1.66	1883
Wellsborough....	Tioga.....	5.55	10	0.83	-4.72	15.25	1885	0.83	1889
South Carolina.									
Statesburgh.....	Sumter.....	3.65	8	7.05	+3.40	7.05	1889	2.12	1886
Tennessee.									
Austin.....	Wilson.....	3.70	20	3.01	-0.69	7.80	1871	0.50	1881
Milan.....	Gibson.....	4.38	6	1.43	-2.95	10.00	1888	0.72	1885
Texas.									
New Ulm.....	Austin.....	3.12	17	3.33	+0.21	8.38	1878	0.09	1885
Vermont.									
Stratford.....	Orange.....	3.52	16	2.00	-1.52	7.90	1885	1.40	1882
Virginia.									
Bird's Nest.....	Northampton	4.61	20	4.05	-0.56	11.25	1875	0.20	1869
Wytheville.....	Wythe.....	3.41	24	5.59	+2.18	7.65	1882	1.38	1884
Wisconsin.									
Madison.....	Dane.....	3.37	18	0.72	-2.65	6.83	1882	0.56	1881
Washington.									
Port Townsend..	Jefferson....	0.80	15	1.34	+0.54	2.12	1879	0.00	1885

\* Frequently. † Report not received.

The above table shows that at Riley, Ill., thirty-eight years record, Vevay, Ind., twenty-four years record, Cresco, Iowa, sixteen years record, Monticello, Iowa, twenty-four years record, Kalamazoo, Mich., thirteen years record, Thornville, Mich., twelve years record, and Wellsborough, Pa., ten years record, the precipitation for the current month was the least, and that at Statesburgh, S. C., eight years record, it was the greatest noted for August during the periods of observation.

#### EXCESSIVE PRECIPITATION.

Monthly precipitation to equal or exceed ten inches was reported at three stations in Florida and Georgia; at two stations in South Carolina, and at one station in Massachusetts, Wisconsin, and Nebraska. In states and territories other than those named precipitation to equal or exceed ten inches was not reported for August, 1889. The heaviest rainfalls in

the states named were: 14.02 at Live Oak, Fla.; 15.56 at Diamond, Ga.; 14.89 at Florence, S. C.; 11.05 at Nantucket, Mass.; 14.89 at Grantsburgh, Wis., and 11.58 at Weston, Nebr. In August of preceding years rainfall to equal or exceed ten inches has occurred most frequently in Florida, where it was reported for thirty years; in Georgia for twenty-one years; in South Carolina for nineteen years; in Alabama and North Carolina for sixteen years; in Iowa, Louisiana, New Jersey, New York, Texas, and Virginia for from ten to fifteen years, inclusive; in Connecticut, Illinois, Indiana, Kansas, Maryland, Massachusetts, New Hampshire, Ohio, and Pennsylvania for from five to nine years, inclusive; in Arizona, Arkansas, Colorado, Dakota, Delaware, District of Columbia, Indian Territory, Kentucky, Maine, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, Tennessee, Vermont, West Virginia, and Wisconsin for from one to four years, inclusive. In states and territories other than those named monthly precipitation to equal or exceed ten inches has not been reported for August in preceding years. Among notable monthly rainfalls for August are: Fort Brooke, Fla., 23.40, in 1840; Fairview, Fla., 21.35, in 1871; New Smyrna, Fla., 23.00, in 1871; Saint Augustine, Fla., 21.50, in 1871; Newport, Fla., 23.25, in 1872; Fort Barrancas, Fla., 30.73, in 1878, and 25.07, in 1879; Savannah, Ga., 20.37, in 1841; Charleston, Ill., 23.04, in 1882; Maurepas and New Orleans, La., 23.44 and 22.74, respectively, in 1888; Newark, N. J., 22.48, in 1843; Elsworth, N. C., 28.33, in 1880; Asheville and Tarborough, N. C., 28.65 and 22.73, respectively, in 1887; Fort Moultrie, S. C., 24.42, in 1859; U. S. Naval Hospital, near Portsmouth, Va., 23.75, in 1867. Exclusive of the instances cited, monthly precipitation to equal or exceed fifteen inches has been reported for six years in Florida; for four years in South Carolina and Texas; for three years in Georgia; for two years in Connecticut, Indiana, Louisiana, Michigan, New York, Pennsylvania, and Virginia; and for one year in Alabama, Illinois, Iowa, Kansas, Massachusetts, Mississippi, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Tennessee, and Wisconsin.

Precipitation to equal or exceed 2.50 inches in twenty-four hours was reported at the greatest number of stations, sixteen, in Kansas; at five in Florida and New Jersey, and at from one to four, inclusive, in Alabama, Arkansas, Connecticut, Dakota, Georgia, Illinois, Indiana, Indian Territory, Iowa, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and Wisconsin. In states and territories other than those named precipitation to equal or exceed 2.50 inches in twenty-four hours has not been reported for August, 1889. The heavier rainfalls for one day, by states, for the month were: 6.50, at Carson, Iowa, 9th; 9.00, at Tecumseh, Nebr., 12th; 5.35, at New Braunfels, Tex., 9th. At Nantucket, Mass., 5.73 fell on the 14th and 15th; at Oceanic, N. J., 5.78 on the 13th and 14th, and at Grantsburgh, Wis., 7.75 on the 19th and 20th. Precipitation to equal or exceed 2.50 inches in twenty-four hours in August has been reported most frequently in Pennsylvania, where it has been noted for eighteen years; in Georgia, South Carolina, and Texas for seventeen years; in Missouri for sixteen years; in Alabama, Connecticut, Dakota, Florida, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Mississippi, New Jersey, New York, North Carolina, Ohio, and Tennessee for from ten to fifteen years, inclusive; in Delaware, Indiana, Louisiana, Maryland, Nebraska, New Hampshire, Virginia, West Virginia, and Wisconsin for from five to nine years, inclusive; and in Arizona, Indian Territory, Kentucky, Maine, Montana, Rhode Island, and Vermont for from one to four years, inclusive. In states and territories other than those named precipitation to equal or exceed 2.50 inches in twenty-four hours has not been reported for August of preceding years. Among the heavier daily rainfalls noted for August are: Fort Barrancas, Fla., 9.75, 29th, 1878; Griffin, Ga., 10.38, 8th, 1883; Mandeville, La., 8.54, 8th, 1888; New Orleans, La.,

8.90, 20th, 1888; Cape May, N. J., 8.46, 18th, 1879; Elsworth, N. C., 9.00, 4th, 1880; Hatteras, N. C., 9.14, 23d, 1880; Kitty Hawk, N. C., 8.14, 15th, 1883; Granbury, Tex., 10.15, 26th, 1888, and Johnstown, Va., 7.70, 18th, 1879. Exclusive of the instances and years cited, rainfall to equal or exceed 5.00 inches in twenty-four hours has been reported in North Carolina for six years; in Illinois and South Carolina for four years; in Massachusetts for three years; in Alabama, Kansas, and Virginia for two years; and in Connecticut, Dakota, Florida, Iowa, Maine, Maryland, Missouri, Nebraska, New Jersey, New York, Pennsylvania, Tennessee, and Texas for one year.

Rainfall to equal or exceed the rate of one inch an hour occurred on five dates in Kansas; four dates in Georgia; three dates in Wisconsin; two dates in Alabama, Florida, South Carolina, and Texas; and one date in Colorado, Dakota, District of Columbia, Iowa, Louisiana, Maryland, Mississippi, Nebraska, New York, Ohio, Pennsylvania, and Virginia. In states and territories other than those named rainfalls to equal or exceed the rate of one inch an hour have not been reported for August, 1889. Among the heavier rainfalls reported for one hour or less are: Grantsburgh, Wis., 1.88 in thirty minutes, 7th; and Marietta, Ga., 1.57 in thirty-five minutes, 13th. At Carson, Iowa, 6.50 in four hours, 9th. In August of preceding years rainfalls to equal or exceed this amount in the period given have been most frequently reported in Texas, where they have been noted for fourteen years; in Pennsylvania for thirteen years; in Kansas and Tennessee for twelve years; in Florida, Georgia, and Missouri for eleven years; in Dakota, Illinois, Indiana, Iowa, Maryland, Michigan, Mississippi, Nebraska, New York, North Carolina, Ohio, South Carolina, and Virginia for from five to ten years, inclusive; and in Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Indian Territory, Kentucky, Louisiana, Maine, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New Mexico, and Rhode Island for from one to four years, inclusive. In states and territories other than those named rainfalls to equal or exceed the rate of one inch an hour have not been reported for August. Among the heavier rainfalls reported for one hour or less in August are: For five minutes: New York City, 0.45, 5th, 1884; and 0.43, 18th, 1887. For ten minutes: Salisbury, N. C., 0.50, 13th, 1888; Norfolk, Va., 2.48, 20th, 1888; New York City, 0.59, 4th, 1888; and 0.40, 21st, 1888. For fifteen minutes: Osage, Iowa, 1.40, 26th, 1881; Saint Louis, Mo., 5.05, 15th, 1848; Mesquite, Tex., 2.12, 11th, 1875. For eighteen minutes: Lead Hill, Ark., 1.00, 2d, 1882. For twenty minutes: Escanaba, Mich., 1.27, 11th, 1877; Albany, N. Y., 1.25, 2d, 1878. For twenty-three minutes: Louisville, Ky., 1.26, 20th, 1878. For twenty-five minutes: Galveston, Tex., 1.55, 17th, 1871; Indianola, Tex., 1.33, 18th, 1882. For thirty minutes: Fort Ellis, Mont., 1.50, 10th, 1883; Mount Auburn, Ohio, 1.52, 26th, 1880; Wellsborough, Pa., 1.95, 21st, 1885; Mesquite, Tex., 2.50, 10th, 1875; Vevay, Ind., 1.90, 13th, 1879. For thirty-five minutes: Auburn, N. H., 3.00, 27th, 1877; Hulmeville, Pa., 2.20, 25th, 1880; Pittsburgh, Pa., 1.85, 16th, 1884; Cincinnati, Ohio, 1.85, 27th, 1882. For thirty-six minutes: Providence, R. I., 3.50, 6th, 1878. For forty-one minutes: Jacksonville, Fla., 3.72, 20th, 1873. For forty-five minutes: Detroit, Mich., 2.48, 31st, 1878. For fifty minutes: Fort Delaware, Del., 3.00, 31st, 1868; Fort Union, N. Mex., 2.34, 12th, 1883.

Table of excessive precipitation, August, 1889.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Am't.	Day.	Am't.	Time.	Day.
Alabama.	Inches.	Inches.		Inches.	h. m.	
Montgomery	2.72	2.72	14-15	1.08	0 30	4
Do.				1.60	0 45	15
Arkansas.						
Devall's Bluff	3.60	3.60	4			
Lead Hill	2.90	2.90	4			
Newport (1)	4.30	4.30	4			
Newport (2)	3.99	3.99	4			



Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Colorado.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>h. m.</i>	
Pueblo	11.78	2.57	23	1.04	1 02	9
<i>Connecticut.</i>						
Wallingford	2.92	1				
<i>Dakota.</i>						
Alexandria	2.75	18				
Yankton				1.46	1 02	12
<i>District of Columbia.</i>						
Washington City				1.05	1 00	6
<i>Florida.</i>						
Alva	11.78	2.57	23			
Archer				2.09	1 00	13
Fort Barrancas		3.00	29-30			
Kissimmee City	13.03					
Lake City		3.01	31			
Live Oak	14.02	2.99	29			
Pensacola		2.91	30			
Villa City				1.25	0 35	20
<i>Georgia.</i>						
Andersonville				2.04	2 00	22
Atlanta				1.10	1 00	5
Augusta		3.32	4			
Diamond	15.56	3.33	24-25			
Do.		2.70	27-28			
Fort McPherson	10.85					
Hephzibah		2.90	11-12			
Marietta				1.57	0 35	13
Point Peter				1.20	1 00	13
Savannah		2.60	6	2.20	1 00	6
Toccoa	10.17					
<i>Illinois.</i>						
Palatine		2.60	9			
<i>Indiana.</i>						
Lafayette		3.36	9			
<i>Indian Territory.</i>						
Fort Reno		2.54	16			
Heldton		3.45	16			
<i>Iowa.</i>						
Carson		6.50	9	6.50	4 00	9
<i>Kansas.</i>						
Augusta		3.00	20			
Bendena				2.25	1 20	12
Brookville		2.50	11			
Ellis (1)		2.50	10			
Ellis (2)		2.50	3	2.50	1 35	3
Englewood				2.00	2 00	3
Fort Hays				1.05	1 00	3
Fort Leavenworth (1)				2.20	1 40	12
Fort Leavenworth (2)		3.00	13			
Fort Riley		3.00	10-11			
Grenola		3.00	10			
Haven		2.75	10			
Horton				2.44	1 15	12
Lawrence		4.00	12			
Leavenworth		3.38	12-13	1.05	0 45	9
Do.				1.91	1 25	12
Do.				1.10	0 45	13
Morse				2.00	1 30	12
Ogallah		2.50	9			
Ottawa		2.70	12-13			
Pago		2.75	20			
Rome				2.30	2 00	11
Sharon Springs		2.50	10			
Topeka		3.07	9-10			
Wichita		2.87	20-21			
Winfield		2.50	10-11			
Yorkville		2.50	11			
<i>Louisiana.</i>						
Grand Coteau		2.75	15	2.75	1 30	15
Mandeville		2.52	5			
Plaquemine		3.00	22			
<i>Maryland.</i>						
Gambrell's		2.70	10	2.13	2 00	23
<i>Massachusetts.</i>						
Framingham		2.50	14			
Gilbertville		2.90	14			
Nantucket		11.05	5-73	14-15		
Provincetown				2.00	1 00	3
Taunton (1)		2.67	3			
<i>Minnesota.</i>						
Duluth		2.76	19-20			
<i>Mississippi.</i>						
Logtown		2.55	15	1.65	0 30	9
Pearlington		2.55	15	2.55	1 00	15
University		3.12	31			
<i>Missouri.</i>						
Oak Ridge		2.50	10			
<i>Nebraska.</i>						
Brownville		2.94	12			
Crete		4.35	11-12			
Hay Springs				2.23	2 05	10
Tecumseh		9.00	12			
Weeping Water		5.25	9			
Weston		11.58				
<i>New Jersey.</i>						
Ashbury Park		2.60	1			
Ocean City		3.00	23			
Oceanic		5.78	13-14			
Rancocas		2.50	14			
Tenafly		2.75	13-14			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>New York.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>h. m.</i>	
Watervliet Arsenal				1.25	0 40	2
White Plains		2.95	14			
<i>North Carolina.</i>						
Clarkton		2.50	27			
Hatteras		2.87	3			
Lumberton		5.19	26			
Wadesborough		2.50	7			
<i>Ohio.</i>						
Bellevue				1.05	0 40	2
Garrettsville				3.07	0 55	2
Sidney		2.92	10			
Vienna				1.32	0 55	2
<i>Pennsylvania.</i>						
Easton		2.99	13-14			
Grampan Hills		2.77	13-14			
Philadelphia		2.78	13-14	1.15	0 40	14
<i>South Carolina.</i>						
Cedar Springs				1.77	1 00	3
Charaw		10.01				
Charleston		4.08	14-15	2.56	1 00	14
Florence		3.13	12			
Do.		3.20	26			
<i>Tennessee.</i>						
Ashwood		2.60	11			
<i>Texas.</i>						
Corpus Christi				1.12	1 05	19
Fort Brown				1.30	1 00	3
La Grange		3.29	9			
New Braunfels		5.35	9			
<i>Virginia.</i>						
Norfolk				1.46	1 10	11
Spottsville		3.40	27-28			
<i>Wisconsin.</i>						
Glasgow				2.27	2 00	18
Grantsburgh		14.89	7-75	1.88	0 30	7
Do.				1.07	1 00	15

Excessive precipitation for July, 1889, received too late for publication.

<i>Arkansas.</i>						
Dardanelle		5.00	29			
<i>Connecticut.</i>						
Hartford (1)		10.79				
<i>Iowa.</i>						
Denmark		4.42	17	4.42	2 45	17
<i>Kansas.</i>						
Coneordia (near)		4.25	22-23			
<i>Pennsylvania.</i>						
Bethlehem		2.72	31			
Coatsville		3.02	30			
Do.		2.80	31			
Doylestown		3.18	19			
Forks of Neshaminy		4.09	31			
Frederick		4.60	31			
Germantown		3.44	31			
Holidaysburgh		2.83	2			
Lansdale		2.63	4			
Do.		3.50	19			
Do.		3.35	31			
Ottsville		2.79	19			
Do.		2.60	30			
Point Pleasant		3.95	20			
Seisholtzville		3.06	31			
Smith's Corners		4.36	20			
Do.		3.17	31			
Swarthmore		2.68	31			
<i>Tennessee.</i>						
Hohenwald		3.40	13			
Nunnally		3.25	13			
Waynesborough		4.94	12			
<i>Texas.</i>						
Fort Worth		14.01	6.20	3		
<i>Mexico.</i>						
La Logia		3.55	6			
Topolobampo		2.50	26			
<i>Dutch Guiana, S. A.</i>						
Burnside Coronie		10.56				

## SNOW.

Greensburgh, Westmoreland Co., Pa., 15th: the vicinity of Mammoth, this county, was visited by a snow storm shortly after daylight this morning. Snow fell in sufficient quantity to cover the ground.—*Ledger and Transcript, Phila., Pa., 16.*

## HAIL.

Descriptions of the more severe hail-storms of the month are given under "Local storms." Hail was reported during the month as follows: 2d, N. Y., Ohio. 3d, Ind., Kans., Mass., Va. 4th, Ind., N. Mex., Ohio. 5th, La. 6th, Kans. 7th, Duk., Me., Mass., Minn., Nebr., N. H. 8th, Minn., Wis. 9th Colo. 10th, N. Y. 11th, Mont. 12th, Dak. 13th, Ariz. 14th, Minn.,

Ohio. 15th, Iowa, Nev. 16th, Colo., Idaho. 18th, Minn., Oregon, Wis. 19th, Colo., Dak. 22d, Ga. 23d, N. J., Va. 24th, Ohio. 25th, Ga., Minn. 27th, Mont. 28th, La. 29th, Ariz., Utah.

#### MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The table shows that the greatest rate per minute for a five minute period was .09 of an inch at Savannah, Ga., on the 6th. The rate per minute for this period at the other stations given was, .07 at Jupiter, Fla., 17th, and at Washington City, 6th; .04 at New York City, 3d; .03 at Saint Louis, Mo., 14th; .024 at Dodge City, Kans., 3d; .02 at Boston, Mass., 5th; and .01 at Cincinnati, Ohio, 2d. The greatest rate per minute for a ten minute period was, .08, at Savannah, Ga., 6th and 8th; .06 at Washington City, 6th; .045 at Jupiter, Fla., 17th; .03 at New York City, 3d; .025 at Saint Louis, Mo., 14th; .02 at Boston, Mass., 1st; Dodge City, Kans., 3d, and .01 at Cincinnati, Ohio, 2d. The heaviest rainfall for one hour, 2.20 inches, was measured at Savannah, Ga., on the 6th; at Washington City, 1.05 fell in one hour on the 6th, while at the remaining

stations given rainfall to equal or exceed one inch an hour was not registered.

The following table is a record of the heaviest rainfalls during August, 1889, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.		10 min.		1 hour.	
	Inch.	Date.	Inch.	Date.	Inch.	Date.
Boston, Mass.	0.10	5	0.20	1	0.25	1
Cincinnati, Ohio	0.05	2	0.07	2	0.10	2
Chicago, Ill.					0.10	8, 13
Detroit, Mich.					0.19*	9
Dodge City, Kans.	0.12	3	0.21	3	0.45	3
Jupiter, Fla.	0.35	17	0.45	17	0.60	17
New York City	0.20	3	0.30	3	0.55	3
Savannah, Ga.	0.45	6	0.80	6, 8	2.20	6
San Francisco, Cal.					T.*	
Saint Louis, Mo.	0.15	14	0.25	14	0.47	14
Washington City	0.35	6	0.60	6	1.05	6

\*Total for month.

#### WINDS.

The prevailing winds during August, 1889, are shown on chart ii by arrows flying with the wind. In New England, the middle Atlantic states, and the Lake region, south to west winds were most frequently noted; over the Florida Peninsula, the west Gulf states, and the southeastern slope of the Rocky Mountains, south to east winds prevailed; in the east Gulf states they were mostly from northeast to east; in the upper Mississippi valley, southeast to southwest; in the extreme Northwest, and on the middle-eastern slope of the Rocky Mountains, south to southeast; over the northern plateau region, and along the north and south Pacific coast, north to west; on the middle Pacific coast, northwest to southwest on the immediate coast, and southeast in the Sacramento Valley; in the south Atlantic states, the Ohio Valley and Tennessee, the northeastern slope of the Rocky Mountains, and the middle and southern plateau regions, variable.

#### HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, were reported as follows: Valentine, Nebr., 54, s., 31st; Winnemucca, Nev., 52, sw., 17th.

#### LOCAL STORMS.

Severe storms were most frequently reported in Kansas and Minnesota, where they were noted for five dates; in New York for four dates; in Pennsylvania for three dates; in North Carolina, New Jersey, Georgia, Indiana, Nebraska, Dakota, Colorado, Missouri, Illinois, and West Virginia for two dates; and in Connecticut, Virginia, Maine, Massachusetts, Mississippi, Wisconsin, Alabama, Iowa, New Mexico, Tennessee, South Carolina, Utah, and California for one date. In states and territories other than those named no severe storms have been reported. They were reported in the greatest number of states, six, on the 14th; in five on the 13th; in four on the 3d and 7th; in three on the 1st and 4th; in two on the 2d, 5th, 6th, 9th, 12th, 15th, 17th, 19th, and 20th; and in one on the 10th, 16th, 18th, 22d, 23d, 25th, and 26th. The following are descriptions of the storms referred to:

**1st. Connecticut.**—Wallington: a rain storm began during the early morning and continued until after 7 a. m. The water in Northrup's brook rose at an alarming rate and by 8 a. m. it was higher than ever known before. The Quinnipiack River also rose rapidly and the manufacturing establishments had to stop operations on account of the high water.—*The Palladium, New Haven, Conn., August 2.* Middletown: the severe rain storm during the day was the heaviest ever known in this section. The Connecticut River has been rising rapidly and

a large amount of wreckage has been floating down the stream. The city sewers have overflowed and a number of houses have been flooded. All of the factories have shut down.—*Boston, Mass., Daily Globe, August 1.* North Carolina.—Soapstone Mount: a severe thunder and rain storm passed over this place between 4.20 p. m. and 5.30 p. m.; in this section several persons were shocked and one person was killed by lightning.—*Report of Mr. H. L. Kimrey.* Virginia.—Richmond: a storm broke over this city about 12.30 a. m., during which the city railway stables were struck by lightning.—*Democrat and Chronicle, Rochester, N. Y., August 2.* Danville: heavy rain prevailed during the day and the Dan River was higher than ever known before. Factories and small dwellings on the river banks were flooded and two bridges and one long trestle have been carried away. The loss is estimated at \$15,000, exclusive of damage to railroads.—*Union and Advertiser, Rochester, N. Y., August 2.*

**2d. New Jersey.**—Elizabeth: during a heavy thunder-storm this morning lightning struck and ignited the Mammoth Pottery Works. The damage done is estimated at \$35,000.—*Herald, Rochester, N. Y., August 3.* New York.—Albany: heavy peals of thunder were heard early in the morning, but, outside of west Albany, no rain fell in the city, although in the immediate vicinity the storm was very severe. The storm did great damage in west Troy. The heavy rain overflowed Dry River, which passes through the city, and cellars and portions of streets were flooded, causing several thousand dollars damage. Mannville, a small hamlet in the western part of West Troy, is inundated. The water on the lowlands is two feet deep in many places, and the damage to property is considerable. The New York Central Railway has been washed out in many places in this section.—*The Argus, Albany, N. Y., August 3.* Troy: a heavy rain-storm, accompanied by high winds and lightning, passed over this city this afternoon, flooding the streets and doing other damage. A part of the new canal culvert at 31st street was carried away.—*Herald, Rochester, N. Y., August 3.* Watkins, Schuyler Co.: a very destructive storm passed over this valley, in a narrow belt, during the afternoon. The lower half of Watkins Glen was flooded and several bridges were washed away. The damage will reach several thousand dollars. Much damage was also done to railroads and railroad bridges in this section.—*Oswego, N. Y., Daily Times, August 2.*

**3d. Kansas.**—Concordia: a thunder-storm, moving from northwest to southeast, occurred between 6.30 and 7.20 p. m. About six miles west of this city the storm was accompanied by hail, which extended over an area about three miles in



breadth. The hail-stones are reported to have been unusually large, and caused much damage in Jewell, Republic, and Cloud counties. *Massachusetts*.—Taunton: during a storm, which occurred in the morning, 1.97 inch of rain fell in fifty minutes. Cellars were flooded and the sewers were inadequate to carry off the water. The aggregate damage will be large. A washout was reported on the Old Colony Railroad between this city and Fall River.—*New Haven, Conn., Union, August 3*. During a thunder-storm on this date, a small tornado, covering a track of about three hundred feet, passed north-eastward in the vicinity of Middleborough, overturning several buildings, and tearing a large barn filled with hay from its foundation. At Bridgewater animals in the field were killed by lightning, and trees were torn up by the roots. At Provincetown the storm was the most severe ever recorded at the station; there was a rainfall of two inches in one hour; hail-stones one-fourth inch in diameter fell at its beginning.—*Bulletin of the New England Meteorological Society for August, 1889*. *New York*.—New York City: the storm which occurred in the morning was more severe around New York than in the city itself, chiefly in Brooklyn and its suburbs, where many streets were flooded, and damage was done by lightning. The storm was very destructive along the Harlem Railway, but the most serious damage was done on the new depressed tracks between Fordham and Melrose, the tunnel affording an aqueduct through which the water rushed three feet or more deep, washing out the banks of the east side of the track and covering the track with several inches of sand and gravel, causing interruption of traffic.—*New York Daily Times, August 4*. Poughkeepsie: a heavy rain-storm prevailed here this afternoon, with frequent hail showers. Similar weather is reported all along the Hudson and in the interior. In southern Ulster county the storm was accompanied by heavy wind. In the interior of all the river counties the crops are damaged 70 per cent., and streams everywhere are greatly swollen. Nyack: the most terrific storm of the season prevailed here this afternoon. The streets are flooded and travel has been suspended. *New York Daily Times, August 4*. *Pennsylvania*.—Reading: The rain storm which passed over this city during the afternoon was the severest of the season, causing the water to rise very rapidly in all streams in the county. The pressure of the water in Angelica Creek was so great that the upper ice-dam broke and portions of the ice-houses were washed away, over four hundred tons being lost.—*The Record, Philadelphia, Pa., August 5*. Morristown: during the heavy rain storm which occurred in the afternoon Plymouth Creek rose six feet in less than half an hour, overflowing its banks and inundating meadows. The storm was the severest, for its short duration, of the season. The public roads were inundated, in places, to a depth of two feet.—*Ledger and Transcript, Philadelphia, Pa., August 5*. *Rhode Island*.—Providence: the thunder and rain storm which occurred during the day caused considerable damage to the highways of Pawtucket. The entire telephone service was demoralized.—*New York Daily Times, August 4*.

**4th. Georgia**.—Augusta: a violent thunder-storm, accompanied by unusually heavy rain, began at 10 p. m. and ended during the night. From 10 p. m. until midnight a rainfall of 3.32 inches was recorded, flooding parts of the city until the morning of the 5th. Washouts occurred on the South Carolina and the Narrow Gauge railroads. The storm moved from southwest to northeast. *Indiana*.—Mitchell: the storm in this section during the day was very disastrous to life and property. A wagon containing a family of five persons was blown from the roadside into Black Creek, and all were drowned. Scores of houses were unroofed and several dwellings were demolished. The storm was general throughout southwestern Indiana.—*Herald, Rochester, N. Y., August 6*. Newburgh: a violent wind and rain storm passed over here this morning, doing great damage. Several persons are reported killed.—*Post-Express, Rochester, N. Y., August 5*. *Mississippi*.—Coffeeville: near Sparta Church, this evening, a cloud-burst destroyed crops for miles around.—*Democrat and Chronicle, Rochester, N. Y., 5th*.

**5th. Indiana**.—Richmond: a most destructive thunder-storm, accompanied by heavy rain, occurred a few miles above this city. The excessive rain flooded streams and prostrated corn, and a number of cattle were killed by lightning. Hail fell at Centreville, where large stones covered the ground. The Elkhorn River rose to flood height in fifteen minutes.—*The Enquirer, Cincinnati, Ohio, August 6*. *Kansas*.—Clear Water: a destructive storm passed south of this city during the day, demolishing two houses and injuring the occupants. Several horses and many cattle were killed, and the corn crop in this vicinity was damaged to the extent of about \$12,000. The path of the storm was a quarter of a mile wide and six miles long.—*Union and Advertiser, Rochester, N. Y., August 6*.

**6th. Kansas**.—Kansas City: a small tornado passed over this city at 6 a. m. As it progressed it appeared to gather force and increase in size. It was followed by a heavy electrical storm, and rain fell in torrents for half an hour, deluging the streets and interrupting traffic.—*Democrat and Chronicle, Rochester, N. Y., August 7*. *Nebraska*.—Wayne: a cloud-burst occurred over Cedar and Wayne counties in the morning, flooding Hartington with twelve inches of water, and Coleridge with nine inches in four and one-half hours. Nearly all the bridges on Bow Creek, Cedar Co., have been swept away, and the Hartington branch of the Omaha road was washed out.—*The Journal, Sioux City, Iowa, August 8*.

**7th. Dakota**.—Aberdeen: a severe hail storm is reported this evening from the northern and central townships of Brown county, cutting a swath several miles in length through unharvested grain, and causing great damage. Hail-stones eight inches in circumference fell during the storm.—*Duluth, Minn., Daily News, August 8*. *Georgia*.—Savannah: a violent thunder-storm, accompanied by heavy rain and high wind, passed over this city from north to south between 12.12 p. m. and 8.30 p. m. The rainfall was excessively heavy, 0.80 inch fell from 4.15 p. m. to 4.25 p. m., and from 4 p. m. to 5 p. m. 2.20 inches of rain were recorded. Maximum velocity of the wind thirty-eight miles per hour from the northwest at 4.10 p. m. A frame building in course of erection was blown down, injuring four men. *Minnesota*.—Mazeppa: the heaviest rain storm experienced for many years, accompanied by wind and hail, passed over this city during the day, blowing down trees and out-buildings. The loss to farmers in small grain is very large.—*Duluth, Minn., Daily News, August 8*. Hallock: at 2 a. m., this, Kittson county, was visited by a severe thunder-storm accompanied by hail. Houses and barns were struck by lightning and wheat fields were partially, if not wholly, destroyed by the hail.—*The Daily Gate City, Keokuk, Iowa, August 8*. *Wisconsin*.—La Crosse: a severe thunder and rain-storm occurred during the afternoon, during which time a rainfall of 2.40 inches was recorded. Five houses in this city were struck by lightning. On the river division of the Milwaukee railroad the tracks were obstructed by stones and earth washed down from the bluffs.—*Union and Advertiser, Rochester, N. Y., August 8*.

**9th. Colorado**.—Florence: a very destructive rain storm visited this locality in the evening and continued over two hours, causing the Arkansas River to rise higher than ever before known. The streets in this city were turned into rivers and people living in the northern portion were forced to leave their houses. The ranchmen living along the river suffered the loss of all their crops, besides horses and cattle, and many buildings have been wrecked. Every bridge spanning the river within ten miles of this city has been washed away. Two miles below this place over three hundred yards of the Atchison, Topeka, and Santa Fé Railway were washed out, and the Denver and Rio Grande track is almost obliterated in places. Many dead horses and cattle, and thousands of railroad ties, were floating down the river. The loss to this locality is estimated at \$75,000. Pueblo: The severe storm which occurred in the evening was the worst ever experienced in this vicinity. The water rose very rapidly in the Arkansas River during the night and on the morning of the 10th a large portion of the city



was flooded. Estimated damage in this city \$100,000.—*Denver, Colo., Republican, August 11.* Iowa.—Des Moines: a thunder-storm, accompanied by very heavy rain, began at 12.03 a. m. and ended at 8 a. m. Lightning struck several houses in this city, and the rain washed away street pavements and caused sewers to break.

**10th. Dakota.**—Rapid City: a rain storm occurred here in the afternoon. As the storm progressed southward it developed a more damaging nature. Near Hermosa the rain fell in torrents, flooding the entire country. Between French and Battle Creeks the rain turned to hail, causing damage to corn and other growing crops in that section.—*The Daily Journal, Rapid City, Dak., August 14.*

**12th. Kansas.**—Atchison: the worst thunder and rain storm ever known here occurred this afternoon, doing much injury in this section to crops and property. Outlying towns, telegraph wires, and the railroads suffered considerable damage.—*Kansas City, Mo., Times, August 13.* Bendena: a severe thunder-storm, accompanied by heavy rain and high wind, passed over this county during the day. The lightning struck in several places and the water swept away numerous bridges and washed out the roads.—*Bendena, Kans., Echo, August 17.* Leavenworth: a severe thunder-storm, moving from northwest to east, began 5.40 p. m., and heavy rain fell from 6.05 p. m. to 7.30 p. m., during which time 1.91 inch was recorded. This was the severest rain and electric storm of the season. Much damage was done in this city by lightning and water; nearly all the cellars in the business portion of the city were flooded. During the storm strong and sudden gusts of wind blew from nearly all directions, shifting suddenly from northwest to east, then to south, and in a few minutes back to north, causing much injury to buildings, trees, and crops. The damage in this city is estimated at from \$20,000 to \$25,000. A second thunder-storm, accompanied by heavy rain, moving from southwest to northeast, began at 11 p. m. and ended during the night. All railroad trains coming to the city were delayed by washouts and land-slides. The Missouri River rose nearly two feet during the night of the 12-13th, carrying away part of the pontoon bridge in course of construction in this city. Nebraska.—Pawnee City: a cloud-burst occurred this afternoon. Bridges are gone and much damage is done, but the crops are not seriously injured.—*Post-Express, Rochester, N. Y., August 13.*

**12-13th. Kansas.**—Hiawatha: the hail and rain storm, which continued throughout the night, was the severest ever known in this county. The hail did much damage in the north side of the county. The entire town of Robinson is flooded, and the Great Island track is under three feet of mud and water for three miles.—*Saint Louis, Mo., Republican, 14th.*

**13th. Missouri.**—Kansas City: a thunder-storm moving from south to north, attended by vivid lightning and almost continuous peals of thunder and heavy rain, passed over this city at about 2 a. m.; rain ending at 4.30 a. m. One row of buildings, undermined by the heavy rain, caved in, and several washouts occurred along the railroads in this vicinity. New Mexico.—Albuquerque: a terrific thunder and wind storm occurred during the afternoon. Hugh whirlwinds of sand came down from the mountains, at intervals, blinding pedestrians, and the clouds were very heavy and dark, but no rain fell.—*Union and Advertiser, Rochester, N. Y., August 14.* New York.—New York City: at 5.10 p. m. a cloud-burst occurred at the Tremont Station on the New York and Harlem Railroad, precipitating such a quantity of water that the tracks were flooded to a depth of eight inches. Trains were delayed two hours.—*The Sun, New York City, August 14.*

**13-14th. Illinois.**—Russell: a tornado struck just east of this town during the night and caused great damage. Holloway's horse ranch and other places were wrecked. The storm appeared to have been about two hundred feet wide and a mile and a half long.—*Chicago, Ill., Morning News, Aug. 15.*

**14th. Missouri.**—Springfield: a thunder-storm, moving from southwest to northeast, began 12.57 p. m. The wind suddenly veered to northwest and increased in velocity to

forty-two miles per hour at 1.10 p. m., damaging orchards and shade trees in this section. New Jersey.—Asbury Park: the heaviest electrical storm that has ever visited this section occurred during the evening. Several buildings were slightly damaged by lightning. Rain fell in torrents and flooded the streets, stopped the electric street cars, and extinguished the electric street lights. Ocean Grove Brook overflowed its banks and flooded several stores. The sluice-ways under the railroad tracks were choked with debris at midnight, and the water backed up into the houses to a depth of six feet.—*Argus, Portland, Me., August 16.* Paterson: a terrific storm burst over this city during the morning. Streets were washed out, cellars flooded, and sewers choked so that the water spurted out of the man-holes to a height of ten feet. In some places the water in the streets was four feet deep. Similar conditions prevailed at Passaic City.—*Ledger and Transcript, Philadelphia, Pa., August 15.* New York.—New York City: the storm this morning was probably the severest of the season. The rain came down in torrents and considerable damage was done to railroad and other property in this vicinity, and on Long Island, and in New Jersey.—*Post-Express, Rochester, N. Y., August 14.* Oswego: the gale which prevailed on Georgian Bay during the day was the severest of the season, the wind blowing steadily at the rate of over forty miles per hour from the northwest. The steamer "Chamberlain" and the tug "Saucy Jim" lost a raft of 16,000 logs off Cape Rich. The tugs "Onaping" and "Superior" also lost a raft of 25,000 logs twenty miles east of Cabet's Head.—*The Palladium, Oswego, N. Y., August 20.* Pennsylvania.—Philadelphia: unusually heavy rain occurred between 3 a. m. and 5 a. m., 1.15 inch being recorded in forty minutes; thunder and lightning prevailed from 3.30 a. m. to 4 a. m. The water quickly overloaded the sewers and backed up into the streets, making them impassable; the first floors in a number of houses were flooded, and the streets were badly washed in various places, especially in the lower portions of the city, where the most damage was done. Easton: the rain storm which passed over this city during the evening was the most violent that has ever been experienced in this section. Within two hours the water in the Lehigh River rose eight feet. Two bridges and a dam on the Clinton branch of the Lehigh Valley Railroad, and all Warren county bridges between Philipsburgh and Stewartsville, have been washed away. The banks in the Morris Canal have broken in two places. The damage to the streets in this place will amount to about \$2,000. Lock Haven: a destructive hail storm passed over a portion of this (Clinton) county in the afternoon, accompanied by an unusual electrical disturbance. At Woolwich hail-stones as large as hens' eggs fell, doing great damage to crops. Bethlehem: an unusually severe rain storm occurred early this morning, and was followed by a violent thunder-storm in the evening. Reports from the country state that the storm caused great damage to the corn crop. The Lehigh River, at this place, is rising at the rate of two feet an hour, and the lowlands are inundated. A serious land-slide occurred on the Lehigh and Susquehanna Railroad, at Treichler's Station, to-night.—*Ledger and Transcript, Philadelphia, Pa., August 15.* Tennessee.—Gallatin: this section was visited by a severe storm in the evening; the rain fell in torrents, and the wind blew down trees, etc. Paris: the most severe storm for many years set in about 5 p. m., and lasted forty-five minutes. Great damage was done to crops, especially to corn; it is estimated that in the path of the storm three-fifths of the latter crop is cut off.—*The Daily American, Nashville, Tenn., August 16.* Memphis: a terrific wind-storm, accompanied by thunder and lightning, passed over this city at 5.55 p. m. The wind attained a maximum velocity of thirty-seven miles per hour from the north, and an extreme velocity at the rate of sixty miles per hour, causing much damage to outhouses, etc.

**15th. South Carolina.**—Columbia: a cloud-burst occurred this evening and poured down a tremendous flood over an area of forty miles square in the Wateree Valley, doing incalculable



lable damage to growing crops, and causing extensive washouts. The losses to farmers and railroads will aggregate several hundred thousand dollars.—*Union and Advertiser, Rochester, N. Y., August 17.* Charleston: a cloud-burst occurred at 7 p. m. between Sumter and Columbia. There was no thunder and lightning but a steady downpour of rain; it is estimated that twelve inches of rain fell in two hours. The area affected is about five miles wide and about fifty or sixty miles long. Seven miles of the Camden branch and South Carolina Railway are washed away. Cotton fields about Gadsden have been washed clean, and hundreds of cattle drowned.

**15-16th. West Virginia.**—Wheeling: a terrific storm prevailed over Lost Creek Valley during the night. Harrison county is inundated, and no trains are moving on the Clarksburgh and Western Railroad to-day. The loss is very heavy throughout that region.—*Baltimore, Md., American, August 17.*

**17th. California.**—Daggett: the heaviest thunder, wind, and rain storm ever known in this section began at 3 p. m., and continued two hours. The heavy rain flooded houses and cellars, and several houses were blown down. All telegraphic communication east of this place was cut off.—*Los Angeles, Cal., Daily Herald, August 17.* Minnesota.—Saint Hilaire: a severe storm, accompanied by high wind, passed six miles north of this town in the evening, doing great damage to the wheat crop. Chunks of ice one inch square were found after the storm passed.—*Democrat-Chronicle, Rochester, N. Y., 19.*

**18th. Utah.**—Salt Lake City: rain began at 8.20 p. m. and continued during the remainder of the day. The rainfall was reported unusually heavy in surrounding districts, causing washouts on the Union Pacific and Utah Central railroads. A land-slide, caused by a cloud-burst, occurred at Weber Canyon, wrecking a Union Pacific freight train.

**19th. Colorado.**—Glenwood Springs: a cloud-burst near this city did much damage. The losses to merchandise, furniture, etc., will reach several thousand dollars.—*Denver News, Denver, Colo., August 19.*

**19-20th. Minnesota.**—Saint Paul: a thunder-storm which began 10.29 p. m., 19th, continued until after midnight. Several houses in this city were struck by lightning, and the telephone wires were considerably interfered with. The rain during the storm was very heavy, and some damage was done by flooding sidewalks and cellars.

**20th. Maine.**—Winthrop: a storm of thirty minutes' duration passed over this place during the day. The sky was obscured by a very black cloud, which hung very low. Rain fell in torrents, and the wind blew a gale, accompanied by heavy thunder. Corn and other crops were seriously injured.—*The Nashville, Tenn., Banner, August 21.* Minnesota.—Duluth: a severe thunder-storm, moving from southwest to northeast, began at 12.05 a. m. and continued until 5 a. m., in which time 2.08 inches of rain were recorded. A large dam in this city gave away under the heavy pressure of water, flooding many houses. It is estimated that the damage done by the flood, in this city alone, will reach \$50,000. Reports from the surrounding country, particularly to the southwest, state that the storm was equally severe there. The Saint Paul and Duluth Railroad suffered severely from washouts and land-slides.

**22d. Alabama.**—Anniston: this city was visited in the afternoon by the severest rain storm, accompanied by wind and hail, that has occurred in this section for many years. In less than an hour the entire city was flooded and many streets were impassable. The approach to the Georgia Pacific is one vast sheet of water for hundreds of feet.—*The Daily Advertiser, Montgomery, Ala., August 23.*

**23d. Pennsylvania.**—Philadelphia: a heavy rain storm, accompanied by thunder and lightning, began at 2.15 p. m. and ended 7.15 p. m. Great damage resulted in the low lying sections of the city by overflowed sewers and flooded streets and cellars. The storm moved from southwest to northeast.

**25th. Minnesota.**—Duluth: a moderate thunder-storm passing from west to east, began 6.50 a. m. and ended 9.20 a. m. Large hail fell between 8.30 a. m. and 8.33 a. m. The stones were of unusual size, some of them being one inch in diameter, and one stone measured five inches in circumference. In formation the stones resembled buttons flattened on two sides.

**26th. North Carolina.**—Rockingham: a cloud-burst occurred over this city and vicinity during the day, destroying the dams and the machinery of several mills. The loss is estimated at \$100,000.—*Morning Herald, Baltimore, Md., 28th.*

#### WATER-SPOUT.

Charleston, S. C.: a water-spout was observed off Sullivan's Island at 1.50 p. m., 12th. It lasted but a few minutes, and then disappeared.

### INLAND NAVIGATION.

#### FLOODS.

The following reports indicate that the most destructive floods of August, 1889, occurred in Connecticut, Maryland, Pennsylvania, New Jersey, Virginia, Colorado, Missouri, and Nebraska during the first half of the month:

New Haven, Conn., 1st: heavy damage from severe rains in the Housatonic and Naugatuck valleys has been reported. People in that section have suffered more than in any other part of the state. The Shelton Mills at Birmingham were obliged to stop operations, as the wheels are completely under water. The meadows above Birmingham were three or four feet under water. The big dam at Birmingham had eight feet of water on its top; the water was never before known to be so high. Many meadows are ruined by sand and sediment left by the flood.—*Boston, Mass., Daily Globe, August 1.*

Baltimore, Md., 1st: many villages, and hundreds of western Maryland farms, are flooded, all the recent destructive storms having been east of the Blue Ridge Mountains. This morning the streets of Union Bridge and other towns were rivers, and for miles along the western Maryland Railroad, in Carroll and Baltimore counties, farm lands are submerged. The bridges over the Monocacy River in Frederick county have been swept away and other damage done. On the flat land of the eastern shore counties the wheat crop is ruined.—*The Record, Philadelphia, Pa., August 2.*

Reading, Pa., 1st: the Schuylkill is overflowing its banks, both above and below this city, doing much damage. In the coal regions a number of collieries have been obliged to shut down. The crops in this section have been much injured by the constant rainfall.—*The Record, Philadelphia, Pa., August 2.*

Mount Holly, N. J., 3d: the recent heavy rains which culminated in the terrific storms on the 1st and 2d have inflicted a great deal of damage on the farming community. The greatest injury was done in the valley of the Rancocas River, which has its source in the regions near Brown's Mills, and from that point to its mouth at Delanco the loss has been heavy. Hundreds of acres of corn have either been washed out entirely or rendered worthless. A lake covering about ten or twelve acres spread south of Monroe street, this city, and in the business portion a ferry was established to convey people to dry places. At 2 a. m. the water reached the engine room of the electric light works, extinguishing the fires, and leaving the city in total darkness. A record of flood at this place, which has been kept for nearly one hundred years, shows that the present flood rose ten inches higher than ever before known. The total loss to this, Burlington county, will exceed \$150,000.—*The Record, Philadelphia, Pa., August 4.*

Martinsville, Va., 3d: this, Henry, county has been visited by one of the most destructive freshets ever known here; the water was as high, if not higher, than during the freshet of

November, 1877. Eleven bridges have been washed away, the loss of which will reach \$6,000. Every bridge over North Mays River and Marrowtown Creek has been washed away, and six mill-dams have been washed out by the heavy pressure of water. Great damage was done to the Danville and New River Railroad, and the first train from Stuart came down this evening. No trains will be here from Danville for a week, and no mail has been received since the 30th of July. The growing crops along all streams have been almost completely ruined, and the total amount of damage cannot be estimated.—*The Lynchburgh, Va., News, August 3.*

Staunton, Va., 6th: the damage done by the recent continuous rain, from Roanoke to Winchester, is distressing. Three-quarters of the wheat crop was caught by the rain while in shocks in the fields, causing it to sprout and grow in the shocks. Altogether these have been the most disastrous rains in the valley for twenty years, and the loss amounts to millions of dollars. Three-quarters of the hay has also been lost, and most of the oats are sprouting as they stand unripened.—*The Lynchburgh, Va., News, August 6.*

Pueblo, Colo., 10th: the late heavy rains have caused a rapid rise in the Arkansas River, and, owing to an incomplete levee near the Santa Fé bridge, the high water spread over a large portion of the southern part of this city, the water being in places two feet in depth, causing much damage to property.

Kansas City, Mo., 13th: the country between Topeka, Kans., and this city is flooded; all trains from the west, to-day, were late, some not arriving at all. Nearly all the main lines were under water, and round-about detours were taken in order to reach this city. The Santa Fé railroad suffered the greatest damage. For ten miles this side of Topeka the road is completely washed away. A few of the western trains on the Santa Fé and Southern Kansas roads were abandoned and all the bridges on these roads have been washed away. A big land-slide occurred on the Kansas City, Council Bluff, and Saint Joseph Railroad. A similar slide occurred on the Chicago, Milwaukee, and Saint Paul road near Randolph and delayed the trains from Excelsior Springs.—*Saint Louis, Mo., Republican, August 14.*

Lincoln, Nebr., 13th: heavy rains have swollen the streams in southwestern Nebraska to an unusual height. Railroad traffic is considerably interrupted, and much damage has been done to property. The Atchison and Nebraska Railroad is under water between Firth and Table Rock, and at Tecumseh the rise in the river drove many people from their homes. At Beatrice and Blue River, houses on the bottom lands are flooded; the people escaped in boats. The Northwestern tracks near Lincoln have been washed away. Salt Creek and the salt basins are one vast lake, and the water as yet shows

no sign of subsiding. From three hundred to five hundred houses are flooded and the people had to move out of danger. *Denver, Colo., News, August 15.*

#### HIGH TIDES.

Asbury Park, N. J., 29th: the high northeast wind has caused the surf to rise higher and rougher than it has been any time during the summer. At high tide the waves washed over the plaza. Deep cuts were made at many points, and the new bulkheads were damaged at several places.—*Rochester, N. Y., Times, August 29.*

#### STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the various stations; the highest and lowest water for August, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, August, 1889, (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La. ....	29.9	1	13.2	31	4.9	8.3
<i>Arkansas River:</i>						
Fort Smith, Ark. ....	22.0	2	11.5	26	2.0	9.5
Little Rock, Ark. ....	23.0	1	16.4	30, 31	4.2	12.2
<i>Missouri River:</i>						
Fort Buford, Dak. ....	.....	1	2.5	31	-0.7	3.2
Omaha, Nebr. ....	18.0	2, 3, 4	8.4	31	6.0	2.4
Leavenworth, Kans. ....	20.0	17	11.4	31	7.0	4.4
Kansas City, Mo. ....	21.0	14	13.9	31	6.1	7.8
<i>Mississippi River:</i>						
Saint Paul, Minn. ....	14.5	29, 30, 31	3.2	15	2.3	0.9
La Crosse, Wis. ....	24.0	31	4.1	1, 2, 7	2.4	1.7
Dubuque, Iowa ....	16.0	13, 14, 30, 31	2.9	9	2.2	0.7
Davenport, Iowa ....	15.0	1	1.8	{ 8, 9, 11, 12, 27, } 28, 29, 30	1.3	0.5
Keokuk, Iowa ....	14.0	1	2.3	29, 30, 31	0.8	1.5
Saint Louis, Mo. ....	32.0	1	13.0	30	6.4	6.6
Cairo, Ill. ....	40.0	5	22.0	31	8.5	13.5
Memphis, Tenn. ....	34.0	1	17.0	31	8.1	8.9
Vicksburg, Miss. ....	41.0	5, 6, 7	23.5	31	12.0	11.5
New Orleans, La. ....	13.0	8	8.1	30, 31	4.4	3.7
<i>Ohio River:</i>						
Pittsburgh, Pa. ....	22.0	2	4.5	31	0.4	4.1
Parkersburg, W. Va. ....	38.0	1	8.5	31	2.9	5.6
Cincinnati, Ohio ....	50.0	5	19.3	31	6.9	12.4
Louisville, Ky. ....	25.0	6	8.2	31	4.1	4.1
<i>Chamberland River:</i>						
Nashville, Tenn. ....	40.0	1	15.5	31	2.4	13.1
<i>Tennessee River:</i>						
Chattanooga, Tenn. ....	33.0	4, 5	10.1	24	3.8	6.3
<i>Monongahela River:</i>						
Pittsburgh, Pa. ....	29.0	2	4.5	31	0.4	4.1
<i>Savannah River:</i>						
Augusta, Ga. ....	32.0	4	20.0	23, 24	7.0	13.0
<i>Willamette River:</i>						
Portland, Oregon ..	15.0	12	4.9	21	1.6	3.3

*Ohio River.*—Pittsburgh, Pa.: on account of low water, navigation was suspended to points below this city on 12th.  
*Monongahela River.*—Pittsburgh, Pa.: boats left Lock No. 1 for points above this city on the 23d.

#### ATMOSPHERIC ELECTRICITY.

##### AURORAS.

Auroras were observed during the month, as follows: 2d, Amana, Iowa. 6th, Wedgwood, N. Y. 15th, Vevay, Ind.; Grantsburgh, Wis. 28th, Arcade and Wedgwood, N. Y.; Saint Vincent, Minn.

Saint Vincent, Minn.: an aurora was observed at 9.10 p. m., 28th. It consisted of a dim glow on the northern horizon, which increased in brilliancy until it attained its maximum intensity at 10.30 p. m., at which time an irregular arch extended from azimuth 135° to 270°, and to altitude about 20°. Numerous "needles" of more or less brilliancy appeared, none of them reaching beyond altitude 30°. After 10.40 p. m. the display waned rapidly and the aurora took the form of a low broad arch, which did not materially change while observed. The display ended during the early morning of the 29th.

##### THUNDER-STORMS.

The more severe thunder-storms of the month are described under "Local storms." Thunder-storms were reported in the

greatest number of states and territories, thirty-three, on the 3d; in thirty-one on the 1st and 14th; in thirty on the 9th and 10th; in twenty-nine on the 2d; in twenty-eight on the 4th and 13th; in twenty-two on the 7th and 12th; in twenty-one on the 6th and 11th; in from fifteen to twenty, inclusive, on the 5th, 8th, 15th, 16th, 17th, 20th, 22d, 23d, 24th, 26th, 29th, 30th, and 31st; and in from ten to fourteen, inclusive, on the 18th, 19th, 21st, 25th, 27th, and 28th. There were no dates for which thunder-storms were reported in less than ten states or territories.

Thunder-storms were reported on the greatest number of dates, thirty-one, in Florida; on twenty-five in Arizona; on twenty-four in Arkansas and Kansas; on twenty-three in Texas; on twenty-one in Colorado, Georgia, Minnesota, and Utah; on twenty in Mississippi; on from fifteen to nineteen, inclusive, in Alabama, Dakota, Illinois, Iowa, Louisiana, Michigan, Nebraska, New York, North Carolina, South Carolina, and Tennessee; on from ten to fourteen, inclusive, in



Indiana, Indian Territory, Maryland, Massachusetts, Missouri, New Jersey, New Mexico, Pennsylvania, Virginia, Wisconsin, and Wyoming; on from four to eight, inclusive, in California, Connecticut, District of Columbia, Idaho, Kentucky, Maine,

Montana, Nevada, New Hampshire, Ohio, Rhode Island, Washington Territory, and West Virginia; and on two in Oregon. There was but one state or territory, Delaware, in which no thunder-storms were reported.

### MISCELLANEOUS PHENOMENA.

#### DROUGHT.

Fort Assinniboine, Mont., 8th: no rain has fallen in this section for three weeks. The soil is in need of rain, and the creeks and rivers are scantily fed by the mountain streams. The hay crop is everywhere reported short, and vegetation wears a parched appearance. 31st: 0.10 inch of rain fell during the month, and the water supply is giving out.

Helena, Mont.: the long-continued drought was broken by the heavy rain on the 19th.

Springfield, Mo., 25th: the drought of the last eleven days has been injurious to the corn crop and pasturage.

Fort Sully, Dak., 30th: the prevailing dry weather has seriously injured corn, oats, and other late crops in this section.

Motes, Ala.: the month has been unusually dry, and crops have suffered to some extent.—*Report of Mr. A. M. Weiler.*

Grand Haven, Mich., 31st: the prevailing drought in this section is severely affecting crops.

Port Huron, Mich., 31st: no rain has fallen in this section since the 30th of May, and the drought is beginning to entail hardship and suffering to the agricultural community. Wells in many places are dry, necessitating hauling of water long distances. Pastures are so dry that farmers are obliged to feed stock in the yards.

Thornville, Mich.: August was a continuation of the July drought and the damage done is very extensive. Corn and potatoes on the uplands are complete failures.—*Report of Mr. John S. Caulkins.*

Montevideo, Minn., 31st: all streams are the lowest ever known; mills on the Minnesota and Chippewa rivers are idle from lack of water. Corn is badly damaged by the severe drought.—*Report of Mr. L. G. Moyer.*

Belvidere, Ill., 29th: a destructive drought is prevailing in this and surrounding counties. Everything is literally burning up. There has been no rain during the month, and crops and pastures are suffering severely.—*Post-Express, Rochester, N. Y., August 29.*

Woonsocket, Dak., 31st: the ground is dryer than it has been for the past eight years. Corn, that promised a full crop on the 1st of the month, will not yield more than one-third, and oats and barley have also suffered considerable damage.—*Report of Mr. L. O. Libbey.*

Huron, Dak., 31st: the long and protracted drought, which was already felt on the 5th, has become very serious. Late crops are much injured; many farmers are cutting corn for use as fodder, as the ears cannot mature; wells are running dry, and the Dakota River is lower than ever known before.

Cresco, Iowa, 31st: the last half of the month has been very warm, dry, and dusty. Corn and potatoes are badly injured, and fall plowing is not practicable on account of drought.—*Report of Mr. Gregory Marshall.*

Dubuque, Iowa, 31st: the month has been the driest on record; in many places wells and cisterns are dry; pasture land is parched, the grass is dead, and the cattle are fed on fodder as in winter.

Concordia, Kans., 31st: this section is suffering from a protracted drought.

New Frankfort, Mo., 31st: the month has been very warm and dry and all vegetation is suffering in consequence. The Missouri River at this point is the lowest ever known.—*Report of Mr. Geo. W. Hawkins.*

West Milton, Ohio, 31st: owing to the warm and dry weather during the month late corn is a failure, and all pastures are parched.—*Report of Mr. L. S. Motte.*

Tiffin, Ohio, 31st: the drought during the latter half of the month has become very severe; wells and cisterns are failing; pastures parched; wheat and potatoes suffering; and it is difficult to prepare the ground for autumn wheat.—*Report of Rev. T. H. Sonedecker.*

Brady, Tex., 31st: the drought has caused great injury to cotton, and the crop will be a failure over most of the county.—*Report of Mr. W. H. Potter.*

Taylor's Ranch, Utah, 31st: reports show that unusually dry weather prevails in Castle, Pleasant, Utah, Tintic, and Juab valleys, and that crops and fruit will fall short in those sections.

#### FOREST FIRES.

Boisé City, Idaho: forest fires were burning in the mountains, about thirty miles north and east of this city, on the 1st and 2d. Reports received on the 9th state that the fires were extinguished or under control.

Los Angeles, Cal., 16th: extensive forest fires prevailed on the hills east of this city during the day.

Phillipsburgh, Mont., 17th: this town is surrounded by forest fires, and all of Georgetown flat is burning. The strong wind during the day has brought the fires within six miles of this place.—*Denver, Colo., News, August 17.*

Seattle, Wash., 26th: for several weeks past this part of the country has been clouded by smoke, caused by extensive forest fires in every direction. The entire eastern slope of the Cascade Mountains, from Natchez Pass north to the boundary, is reported to be in flames.—*The Daily American, Nashville, Tenn., August 27.*

Port Huron, Mich.: fire broke out in the brush along the railroad west of this city during the forenoon of the 29th, and, owing to the prevailing drought, the fires spread rapidly, and several buildings were consumed. The fires in this immediate vicinity were extinguished on the 30th. Distant fires, west of this city, were observed on the 29th and 30th.

Hobart, Mich.: forest fires are raging in all directions.

Sullivan, Mich., 30th: forest fires are burning in the neighborhood, west of here, near Spencer's Mill. A great amount of damage has been done by them.—*Post-Express, Rochester, N. Y., August 30.*

Helena, Mont., 31st: destructive forest fires prevailed in this section during the entire month; many million feet of lumber and thousands of acres of timber have been consumed. The heavy rain on the 19th failed to put out the fires.

Portland, Oregon, 31st: the fires in the state during the month have caused considerable damage to the forests; fences, barns, and a few houses have been consumed. The rains during the latter part of the month have quenched them considerably.

Fort McKinney, Wyo., 31st: three large forest fires started in the mountains west and south of this place on the 20th, and they are still burning fiercely.

Forest fires were also reported as follows: Tuohy's, Cal., 14th, 15th; Red Bluff, Cal., 19th to 31st; Fort Buford, Dak., 7th; Fort Sill, Ind. T., 11th, 31st; Port Huron, Mich., 29th; Fort Custer, Mont., 24th; Powder River, Mont., 27th; Mount Washington, N. H., 6th.

#### PRAIRIE FIRES.

Pearsall, Tex., 4th: a recent prairie fire in this (Frio) county, which lasted several days, burned over nearly 5,000 acres of grass.—*Express, San Antonio, Tex., August 6.*

Miles City, Mont., 15th: the prairies, a few miles north and southeast of this place, are on fire. The fires cover several thousands of acres of land. Extensive prairie fires are also

raging in this county below Fallon, travelling towards Glendive. The fires were started by lightning during the storm on the evening of the 11th.—*The Chronicle, La Crosse, Wis., 15th.*

#### HALOS.

Solar halos were most frequently reported in New York, where they were noted on eleven days; in Illinois on ten; in Kansas on five, and on from one to four dates, inclusive, in Alabama, Florida, Indiana, Iowa, Kansas, Massachusetts, Michigan, Mississippi, Nebraska, Nevada, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, and Wisconsin. In states and territories other than those named no solar halos were reported. They were reported in the greatest number of states and territories, five, on the 8th and 20th; in from one to four, inclusive, on the 1st to 7th, 9th to 16th, 18th, 19th, 21st to 26th, and 28th to 31st, inclusive. No solar halos were reported on the 17th and 27th. Arcade, N. Y.: on the 23d, at 11 a. m., a solar halo was formed with a radius of 22°. The halo above the sun was very brilliant through an arc of about 60°. The other section of the halo was fainter. Through the sun a faint circle appeared, with its centre on the vertical circle passing through the sun. The estimated radius of the circle passing through the sun was 45°. The circle was fairly well defined, except within the halo of 22° radius, where it was scarcely visible. The large circle lasted about half an hour; the smaller halo was visible at intervals all day.—*Report of Mr. H. M. Clough.* Wedgwood, N. Y.: a remarkable solar halo was observed from about 10 a. m. to 2 p. m., 23d, consisting of a brilliant prismatic circle about 45° in diameter concentric to the sun, and a circle of white light about 90° in diameter, the periphery of which cut the sun's disk and extended to the northward.—*Report of Mr. O. F. Convin.* Number Four, N. Y.: a brilliant halo appeared for about two hours in the middle of the day of the 23d. The ring exhibited the prismatic colors in a remarkable degree. Between the ring and the sun the sky was very dark. At the same time there was a slight misty arc or section of a ring about 40° from the sun to the north.—*Report of Mr. C. Fenton.*

Lunar halos were most frequently reported in North Carolina, where they were noted on eight days; in Virginia on six, and in Kansas on five; on from one to four dates, inclusive, in Arizona, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New York, Ohio, South Carolina, Tennessee, Texas, and Wisconsin. In states and territories other than those named no lunar halos were reported. They were reported in the greatest number of states and territories, seven, on the 4th; in six on the 5th, 6th, 7th; in from one to four, inclusive, on the 1st, 2d, 3d, 8th to 13th, inclusive, 15th, 17th, 20th, 23d, 27th, 29th, 30th, 31st. For dates other than those named no lunar halos were reported.

#### SUN SPOTS.

Mr. John W. James, Riley, Ill.: three groups of small and variable spots seen 1st to 17th; one group vanishing on the 4th, before reaching west edge; the spots at one end of one of the other groups had merged into one large spot, estimated 33,000 miles long and 23,000 miles wide. The large spot seen in June and July came around again, but very much smaller, disappearing by the solar rotation 20th. None seen then until the 27th, when a large spot was observed near the east edge, and on the sun's meridian on the 31st, estimated size, 27,000 miles in diameter. Mr. C. E. Buzzell, Leaf River, Ill.: the group of July 28th disappeared while on the meridian August 2d. August 1st, cloudy; 2d, a group of twenty-three spots, first observed near the east limb, passed the meridian 5th, west limb 11th; 8th, cloudy; 9th, new group, first observed three days east of meridian, disappeared 17th by rotation; 19th, one spot by rotation on east limb, disappeared by rotation 20th (probably third return of the June 16th disturbance); 27th, cloudy; 28th, well-defined spot on east limb by rotation, meridian September 2d. This spot was accompanied by prominent faculae during entire revolution. Mr. M. A.

Veeder, Lyons, N. Y.: 1st, an extensive group of spots was about five days advanced from the eastern limb. These spots faded out on 5th, and the faculae remaining in their location disappeared by rotation on the 8th; 1st and 2d, also much faculae and many small spots appeared by rotation. This group underwent many changes in its transit, fading out in part, and the remainder disappeared by rotation on 11th. 5th, much faculae appeared by rotation; in connection with this group several spots formed on 9th and increased in size, disappearing by rotation on the 18th. 9th, a spot of considerable size, followed on succeeding days by much faculae, appeared by rotation and completed its transit on the 22d; 16th, a bright faculae appeared by rotation, but faded out during its transit; 26th, a large spot appeared by rotation and continued until the end of the month. Mr. H. D. Govey, North Lewisburgh, Ohio: sun spots were observed from 1st to 19th, and from 29th to 31st, inclusive.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Faculae.	
July, 1889.											
3, 3 p. m.	0	2	0	0	0	0	1	4	.....	.....	Definition poor, thr'gh clouds.
5, 12 m.	0	0	0	0	0	0	1	1	.....	.....	Definition poor, spots small.
6, 1 p. m.	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
8, 12 m.	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
11, 3 p. m.	1	2	0	0	0	0	1	2	.....	.....	Definition good.
12, 1 p. m.	1	8	0	0	1	3	2	10	.....	.....	Definition good, large spot.
14, 5 p. m.	0	7	0	0	0	2	2	17	.....	.....	Definition good.
15, 12 m.	0	0	0	0	0	2	2	11	.....	.....	Definition good.
16, 11 a. m.	0	0	0	0	0	2	2	11	.....	.....	Definition good.
17, 12 m.	0	0	0	0	0	2	2	10	.....	.....	Definition good.
18, 10 a. m.	0	0	0	0	0	2	2	22	.....	.....	Definition good.
20, 10 a. m.	0	0	1	5	0	0	1	17	.....	.....	Definition poor.
22, 10 a. m.	0	0	0	0	0	1	1	2	.....	.....	Definition poor.
23, 10 a. m.	0	0	0	0	0	0	1	1	.....	.....	Definition good.
24, 10 a. m.	0	0	0	0	0	0	1	1	.....	.....	Definition good.
25, 10 a. m.	1	1	1	1	0	0	1	1	.....	.....	Definition good, small spot.
29, 11 a. m.	1	21	0	0	0	2	2	22	.....	.....	Definition good, all small.
30, 10 a. m.	0	0	0	0	0	2	2	22	.....	.....	Definition good.
31, 3 p. m.	0	2	1	1	0	0	1	23	.....	.....	Definition poor.
August, 1889.											
1, 11 a. m.	0	0	0	0	0	0	1	22	.....	.....	Definition poor.
2, 10 a. m.	1	6	0	0	0	0	2	26	.....	.....	Definition fair.
3, 10 a. m.	0	9	0	0	0	0	2	35	.....	.....	Definition good.
4, 3 p. m.	0	0	1	11	0	0	1	21	.....	.....	Definition poor.
5, 3 p. m.	0	0	0	0	0	0	1	24	.....	.....	Definition poor, 2 large spots.
6, 9 a. m.	0	2	0	0	0	0	1	26	.....	.....	Definition good.
7, 10 a. m.	0	24	0	0	0	0	1	50	.....	.....	Definition good, large spot breaking up.
8, 9 a. m.	1	1	0	0	1	1	2	24	.....	.....	Definition good, 4 large spots.
10, 1 p. m.	1	3	0	0	0	0	3	20	.....	.....	Definition poor.
11, 9 a. m.	0	4	0	0	0	0	3	26	.....	.....	Definition good.
12, 10 a. m.	0	0	1	4	0	0	2	9	.....	.....	Definition poor, 2 large spots.
13, 10 a. m.	0	4	0	0	0	0	2	30	.....	.....	Definition good, 4 large spots.
14, 11 a. m.	0	0	0	0	0	0	2	12	.....	.....	Definition good.
15, 1 p. m.	0	0	0	0	0	0	2	14	.....	.....	Definition good.
16, 9 a. m.	0	0	0	0	0	0	2	12	.....	.....	Definition good, 3 large spots.
17, 11 a. m.	0	0	0	0	0	0	2	6	.....	.....	Definition good.
18, 9 a. m.	0	0	1	3	0	0	1	1	.....	.....	Definition good, 1 large spot.
19, 10 a. m.	1	1	0	0	1	1	2	2	.....	.....	Definition good.
20, 10 a. m.	0	0	0	0	0	0	1	1	.....	.....	Definition good.
21, 9 a. m.	1	1	1	1	0	1	1	1	.....	.....	Definition good.
22, 10 a. m.	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
23, 9 a. m.	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
24, 10 a. m.	0	0	0	0	0	0	0	0	.....	.....	Definition good.
25, 4 p. m.	0	0	0	0	0	0	0	0	.....	.....	Definition good.
26, 11 a. m.	1	1	0	0	1	1	1	1	.....	.....	Definition poor, 1 large spot.

#### METEORS.

The distribution of meteors, by dates, was as follows: 1st, Keeler, Cal. 2d and 3d, Webster, Dak. 4th, Keeler, Cal.; Lansing, Mich. 5th, Little Rock, Ark. 6th, Mesquite, Tex. 8th, Duck, Ga.; Vevay, Ind. 10th, Little Rock, Ark.; Jacksonborough, Ohio. 11th, Whipple Barracks, Ariz.; Washington, N. C.; Jacksonborough, Ohio. 12th, Vevay, Ind.; Jacksonborough, Ohio. 14th, Mesquite, Tex. 15th, Browns-ville, Tex. 17th, Mesquite, Tex. 18th, Whipple Barracks, Ariz.; Villa City, Fla.; Charleston, Ill.; Vevay, Ind.; North Billerica, Mass.; Beverly, N. J.; Bement, Ohio. 19th, Bement, Ohio; Lusk, Wyo. 20th, Villa City, Fla. 21st, Raleigh, N.



C.; Mesquite, Tex. 22d, Walla Walla, Wash. 23d, Charleston, Ill.; Vevay, Ind.; Riddleton, Tenn.; Cleburne, Tex. 25th, Kissimmee, Fla.; Beverly, N.J.; Cleburne, Tex. 27th, Keeler, Cal.; Riddleton, Tenn.; Mesquite, Tex. 28th, Vevay, Ind.; Muscatine, Iowa; North Sutton, N. H.; Carrollton, Ohio. 29th, Red Bluff, Cal.; North Sutton, N. H.; Green Bay, Wis. 30th, Red Bluff, Cal.; Lacon, Ill.; Kalamazoo, Mich. 31st, Spearfish, Dak.

Duck, Ga.; a large meteor was observed at 8 p. m., 11th. It shot across the sky from north to west about 20° above the horizon. Its duration was about six seconds.—*Report of Mr. A. L. Gillespie.*

Mesquite, Tex.: two large meteors were observed near the North star at 8 p. m., 14th. The first one started about 20° south and east of the North star; the second one started about 10° southeast of the North star, and travelled south to a point north and 20° west of Jupiter; this one was very brilliant and left a visible path of sparks. Eight smaller meteors were seen at this observation within a space of forty-five minutes.—*Report of Mr. Silas G. Lackey.*

Walla Walla, Wash.: a brilliant meteor was observed at about 8 p. m., 22d, moving in a southeasterly course toward the earth; before it disappeared it exploded, lighting up the sky like a flash of lightning.—*The Daily Union, Walla Walla, Wash., August 23.*

Red Bluff, Cal.: nine small meteors were observed about 15° north of the zenith, between 1.15 a. m. and 2 a. m., 29th. Their general course was southeast, though a few deflected to

the southwest. Two other small meteors were observed at 1.10 a. m., 30th.

Green Bay, Wis.: a brilliant meteor of a golden color, tinged with red, and accompanied by a luminous trail, about 5° long, was observed at 9.30 p. m., 29th. It started near the zenith, moved in a northeasterly direction, and when about 40° above the horizon broke into numerous fragments. The display lasted about ten seconds.

Spearfish, Dak.: a brilliant meteor was observed at 7.30 p. m., 31st. It shot down from north to south, and when close to the horizon it appeared to explode with a flash like burning powder. Its duration was about three seconds.—*Report of Mr. G. H. Warren.*

#### MIRAGE.

Mirage were observed as follows: Webster, Dak., 2d; Woonsocket, Dak., 3d, 4th; Hampton, Iowa, 16th.

#### SAND STORMS.

Winnemucca, Nev., 31st: a gale and sand storm began at 1.05 p. m. and continued until 11.20 p. m.; maximum velocity of the wind forty-four miles per hour from the southwest at 5.35 p. m., and the average velocity during the storm was thirty-two miles per hour. A great deal of electricity was present in the atmosphere during the storm, and a perceptible shock was felt with the finger four inches away from an electric wire. Sand storms were also reported as follows: Wilcox, Ariz., 4th, 9th, 21st; Tuohy's, Cal., 15th; Fresno, Cal., 18th; Dodge City, Kans., 3d; Winnemucca, Nev., 17th, 18th.

### VERIFICATIONS.

#### FORECAST FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for August, 1889, were made by Captain H. H. C. Dunwoody, 4th Artillery, Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, August, 1889.

States.		States.	
Maine.....	83.0	Tennessee.....	88.5
New Hampshire.....	83.7	Kentucky.....	88.6
Vermont.....	81.8	Ohio.....	85.7
Massachusetts.....	84.5	West Virginia.....	85.0
Rhode Island.....	86.6	Indiana.....	90.5
Connecticut.....	80.3	Illinois.....	89.8
Eastern New York.....	84.3	Lower Michigan.....	88.6
Western New York.....	84.2	Upper Michigan.....	78.8
Eastern Pennsylvania.....	85.9	Wisconsin.....	85.0
Western Pennsylvania.....	84.8	Minnesota.....	87.7
New Jersey.....	82.6	Iowa.....	86.3
Delaware.....	87.1	Kansas.....	81.0
Maryland.....	89.5	Nebraska.....	85.2
District of Columbia.....	84.8	Missouri.....	88.0
Virginia.....	88.8	Colorado.....	86.6
North Carolina.....	85.4	Dakota.....	89.9
South Carolina.....	88.7	Southern California*.....	86.9
Georgia.....	85.4	Northern California*.....	89.2
Eastern Florida.....	91.4	Oregon*.....	88.8
Western Florida.....	82.5	Washington Territory*.....	86.7
Alabama.....	87.6		
Mississippi.....	93.2	By elements: Weather.....	88.3
Louisiana.....	88.5	Temperature.....	83.2
Texas.....	90.6	Monthly percentage of weather and	
Arkansas.....	86.3	temperature combined.....	86.3

\*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10. ‡The forecasts of temperature in districts east of the Rocky Mountains were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day.

#### CAUTIONARY SIGNALS FOR AUGUST, 1889.

Statement showing percentages of justifications of wind signals for the month of August, 1889:

*Wind signals.*—(Ordered by Captain H. H. C. Dunwoody.) Total number of signals ordered, forty-six; justified as to velocity, wholly, thirty; justified as to direction, forty-five. Of the signals ordered forty-five were cautionary, of which twenty-nine were justified, and one storm, which was justified. Eighteen were ordered for easterly winds, of which seventeen were justified, and twenty-eight were ordered for westerly winds, all of which were justified. Percentage of justifications, 66.8.

Percentages of local verifications of weather and temperature signals as reported by directors of the various State Weather Services for August, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois.....	86.9	86.7	Nebraska.....	90.0	88.6
Indiana.....	89.0	89.0	New Jersey.....	85.1	92.9
Kansas.....	82.1	86.7	New York.....	87.5	88.8
Kentucky.....	79.0	95.0	Ohio.....	92.0	87.0
Michigan.....	81.5	85.7	Pennsylvania.....	84.0	90.0
Minnesota.....	83.0	79.0	South Carolina.....	85.5	89.0

### STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts are republished from reports for August, 1889, of the directors of the various state weather services:

#### ALABAMA.

The month just closed has been remarkable for the small amount of rainfall in middle and southern Alabama and the heavy precipitation in northern parts of the state. The average rainfall was 0.80 below the normal. In all portions of the state, except in north Alabama, there has been a deficiency

since the 1st of January, and in many localities the wells are going dry. The temperature was normal. There were no decidedly hot days, and the nights were cool and pleasant.

#### SUMMARY.

Temperature.—Monthly mean, 76; highest monthly mean, 80, at Citronelle

and Livingston; lowest monthly mean, 71.2, at Valley Head; maximum, 97, at Wiggins, 12th; minimum, 51, at Valley Head, 18th; range for state, 46; greatest local monthly range, 41, at Citronelle; least local monthly range, 16, at Livingston.

**Precipitation.**—Average for the state, 3.28; greatest, 6.33, at Montgomery; least, 1.39, at Wiggins.

**Wind.**—Prevailing directions, east and southeast.—*P. H. Mell, Signal Corps, Auburn, director.*

#### ARKANSAS.

##### SUMMARY.

**Temperature.**—Average monthly mean, 76.5; highest monthly mean, 81, at Paris, Tex.; lowest monthly mean, 73.6, at Forrest City; maximum, 101, at Lead Hill, 10th and 28th; minimum, 52, at Hot Springs, 30th; range for state, 49; greatest local monthly range, 44, at Hot Springs; least local monthly range, 19, at Dallas.

**Precipitation.**—Average for the state, 2.05; greatest monthly, 4.65, at Lead Hill; least monthly, trace, at Dallas.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

#### COLORADO.

##### SUMMARY.

**Temperature.**—Monthly mean, 64.9; highest monthly mean, 76.8, at Julesburg; lowest monthly mean, 42, at Dolly Varden Mine; maximum, 106, at Delta, 14th; minimum, 25, at Breckenridge, 23d; range for state, 80.

**Precipitation.**—Average for the state, 1.51; greatest monthly, 3.45, at Alma; least monthly, 0.41, at Monte Vista.—*Prof. F. H. Loud, Colorado Springs, director; T. W. Sherwood, Sergeant, Signal Corps, assistant.*

#### DAKOTA.

High winds, high temperature, and a deficiency of precipitation seriously injured all late crops.

##### SUMMARY.

**Temperature.**—The average temperature, 71.6, was about 4.5 above the normal; highest monthly mean, 77, at Napoleon; lowest monthly mean, 66, at Saint Vincent, Minn.; maximum, 110, at Steele, 27th; minimum, 32, at Saint Vincent, Minn., 4th; greatest daily range, 52, at Steele, 4th; least daily range, 4, at Gallatin, 2d; mean monthly range, 29.

**Precipitation.**—Average, 1.35, which is about 1.20 below the normal; greatest monthly, 3.81, at Alexandria; at Clarke no precipitation was reported; greatest rainfall in twenty-four hours, 2.75, at Alexandria, 18th.—*S. W. Glenn, Sergeant, Signal Corps, Huron, in charge.*

#### ILLINOIS.

##### SUMMARY.

**Temperature.**—Monthly mean, 71.7; highest monthly mean, 76.4, at White Hall; lowest monthly mean, 67.2, at South Evanston; maximum, 98, at Dwight, Mount Morris, Oneida, Pontiac, and Quincy, on the 29th, and at Winnebago, 30th; minimum, 45, at Dwight and South Evanston, 6th.

**Precipitation.**—Average for the state, 1.25; greatest, 3.59, at Jordan's Grove; least, 0.08, at Pana.

**Wind.**—Prevailing direction, southeast.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

#### INDIANA.

##### SUMMARY.

**Temperature.**—Exceedingly cool temperature prevailed throughout the month, especially during the nights, except during the last few days when, on the 31st, the maximum 90°, and slightly above, was recorded at most stations; the lowest temperature occurred at different stations on different dates. The mean temperature for the month was 2.4 below the normal for eighteen years, and 1.2 below that for seven years; the greatest deficiency, 2.4, was noted in the southern portion, and the least, 1.0, in the northern, while the deficiency in the central portion, 1.3 differed only slightly from the latter. The mean for August is the lowest on record for Indiana, except that of 1885, 70.4, and that of 1875, 70.2, which were nearly equal to it. In Whitley county, in the northern portion of the state, it is reported that very light hoar-frost formed on the morning of the 17th.

**Precipitation.**—August, 1889, was an exceedingly dry month. The average amount of precipitation for the state differed, 2.02, from the normal for seven years, and the deficiency at various stations ranged from 1.23 to 4.41, except at La Fayette, where an excess of 0.67 above the normal for ten years occurred. The greatest deficiency occurred in the central portion, and the least is noted in the northern portion. The least amount of precipitation, 0.02, was measured at Vevay. No strong or destructive winds occurred during the month. Because of the insufficiency of precipitation, and continued dry weather, corn and pastures are suffering, and plowing delayed, the ground being too hard and dry for these operations.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

#### IOWA.

August, 1889, averaged nearly normal in temperature, and was clear and dry; southerly winds and calms prevailing. The mean temperature was 0.2 above the normal. The temperature was unequally distributed during the month, the first half being decidedly cold, averaging 4 below the normal, while the last half was markedly hot, being 4 above the normal. The hottest spell comprised the last five days of the month, and averaged 11 above the normal,

making it by far the hottest spell of the season. The number of hot days on which the temperature reached or exceeded 86 was nine, all occurring in the second half of the month.

The total rainfall has been very light throughout the state, averaging about one-third of the normal amount. It was greatest, and generally 2.00, in a belt extending from Page and Harrison counties in the southeast to Hancock and Mitchell counties in the north. The rainfall was least, and did not reach 1.00, in an irregular belt from Wayne and Lucas counties in the south over Henry, Washington, Louisa, Jackson, and Buchanan counties to Howard county in the northeast; in the northwest the total rainfall was also less than 1.00. In parts of the state not specified the rainfall averaged about 1.50. Nearly all the rain fell during the first half of the month, the latter half being almost destitute of measurable rainfall. The most extended and abundant rainfall occurred on the evening of the 8th into the morning of the 9th, with heavy thunder and lightning extending from central Iowa to the northeast; during this storm the lightning did considerable damage, and hail fell in Allamakee county. No destructive wind occurred. Rain fell in the state during the month on fifteen days, and it was general over half of the state on the 8th, 12th, and 20th; on the last two of these dates the rain was very light. The protracted and high temperature during the last half of the month, combined with the absence of rain, has hastened the ripening of corn, but it will also notably diminish its yield.—*Dr. Gustavus Hinrichs, Iowa City, director.*

#### IOWA WEATHER CROP BULLETIN SERVICE.

The temperature during the first ten days of the month was considerably below the normal, bringing light frosts on the 5th. During the latter part of the month, especially from the 28th to the 31st, the temperature was exceedingly high. The 29th and 30th were the warmest days during the past summer. The precipitation was generally below the normal. During the first ten days, however, numerous and well-distributed showers occurred. During the last half of the month there was but little rainfall. The cool weather in the early part of the month checked the growth of corn, and the dry, hot weather of the last fifteen days hastened its maturity, thus relieving it of the danger of damage by frost. The dry weather has seriously affected pastures, which are reported from many points as being parched.

##### SUMMARY.

**Temperature.**—Monthly mean, 71.5; highest monthly mean, 76.3, at Glenwood; lowest monthly mean, 66.4, at Jefferson; maximum, 104, at Blakeville, 30th; minimum, 37, at Fayette, 5th; average maximum, 93; average minimum, 51.3; greatest local monthly range, 60, at Fayette; least local monthly range, 24, at Independence; monthly range for the state, 67; average monthly range, 41.9.

**Precipitation.**—Average for the state, 1.48; greatest, 3.14, at Logan; least, 0.12, at Bancroft.

**Wind.**—Prevailing direction, south.—*G. M. Chappel, Sergeant, Signal Corps, Des Moines, in charge, Iowa Weather Crop Bulletin Service.*

#### KANSAS.

##### SUMMARY.

**Temperature.**—The temperature is deficient in the eastern half of the state. In the eastern division this deficiency amounts to 2.5, and diminishes as the central tier of counties is approached, being but 0.8 to 0.9 in the line of counties from Republic to Sumner. It is about normal from Smith to Barber, while west of this tier there is an excess which in Ford amounts to 1.6. The mean temperature for the western division is 78.6; for the middle, 75.8; and for the eastern division, 73.9; while for the state it is 76.1.

**Precipitation.**—The average for the western division is 2.60; for the middle division 2.50, and for the eastern division 3.41. The largest monthly rainfall occurred in contiguous portions of Douglas, Jefferson, and Leavenworth, where it is 8.00 and over. It rapidly diminishes from Douglas south, and is less than 1.00 in Cherokee, Crawford, Neosho, Labette, Wilson, Montgomery, east half of Chautauqua, and south half of Woodson. West of these counties the rainfall increases to 4.00, and over, in the contiguous portions of Elk, Butler, Cowley, Sedgwick, Sumner, Kingman, Harper, and southeastern part of Reno. West of Jefferson the rainfall diminishes to less than 3.00 in the western half of Pottawatomie, and in Riley and Clay, and to less than 2.00 in Dickson and the contiguous portions of Morris and Marion; it then increases to nearly 5.00 in Cloud, diminishes to less than 1.00 in the adjacent portions of Graham, Sheridan, Trego and Gove, and then increases to 4.00 and upward in Logan and east half of Wallace, which increase extends northeastward through Thomas and Decatur. In the south the rainfall diminishes from 4.00 in the eastern portions of Harper and Kingman, and southeast corner of Reno, to less than 1.00 in the northwestern part of Reno, western halves of Rice and Ellsworth, southeast corner of Russell, in Barton, Strafford, Pratt, and eastern portions of Kiowa, Edwards and Pawnee, and then increases to 3.00, and upwards, from the southwest portion of Ellis, southwestward through Hamilton, with a belt of 4.00 through the central portion of Kearney, Finley, and Garfield into the southwest part of Ness.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

#### KENTUCKY.

##### SUMMARY.

**Temperature.**—The average temperature of the state, as deduced from the tri-daily observations, was 72.1; from the mean of the average maximum and minimum temperatures, 70.6. These figures are from 4 to 6 less than the normal for the month. The highest temperature recorded during the month



was 100, at Murray, 26th; the lowest, 50, at Shelbyville, 16th. The warmest days were the 26th and 31st, and the coolest the 15th and 16th. The temperature was markedly uniform throughout the month, the average monthly range being 34.9; the greatest, 46, at Murray, and the least, 21, at Bernstadt.

**Precipitation.**—The average rainfall for the state was 1.23, which is about 2.25 less than the normal amount. Little or no rain fell from August 10th to September 1st, and the drought had, on the latter date, assumed an alarming aspect, especially in the central and northern portions of the state. The greatest monthly rainfall reported was 2.58, at Bowling Green, and the least, 0.23, at Louisville. At the latter place the amount of rainfall from January 1st to August 31st was 12.24 less than the normal; a deficiency of about 31 per cent. The average number of rainy days during the month was 4; cloudy, 5; partly cloudy, 11, and cloudless, 17.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

#### LOUISIANA.

The month was in decided contrast to August, 1888, when the sunshine amounted to but 33 per cent., and when the rainy days numbered as high as 25 at certain stations. The average sunshine for the state during the past month was 66 per cent., and the average number of days on which appreciable rain fell was but eight. There was no excessive heat, no damage from drought, heavy rain, or high winds.

#### SUMMARY.

**Temperature.**—Monthly mean, 79.1; highest monthly mean, 84.0, at Lake Charles; lowest monthly mean, 73.4, at Clinton; maximum, 101, at Cameron, 14th; minimum, 53, at Saint Joseph, 18th; range for the state, 48; greatest local monthly range, 41, at Liberty Hill; least, 21, at Shell Beach; mean daily range, 20.7.

**Precipitation.**—Average for the state, 3.55; for the northern section, 1.45; southern section, 5.25; greatest local monthly rainfall, 8.36, at Hammond; least, 0.05, at Minden.

**Wind.**—Prevailing direction, southeast.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

#### MICHIGAN.

The features of the month were the continued low night temperatures, which resulted in frosts on the 10th and 11th of the month, and the light rainfall for the month, this month being the driest of any on the records of the last fourteen years.

#### SUMMARY.

**Temperature.**—The mean temperature for the month, 66.7, is 1.7 below the normal of fourteen years. The temperature was above the normal on ten days, normal on one, and below the normal on twenty days. The last week of the month was the warmest. The highest mean daily temperature, 73, occurred on the 20th, when the temperature was 3 above the normal, and the lowest, 60, occurred on the 11th, when the temperature was 9 below the normal. The highest mean daily temperature in the past fourteen years, 81, occurred on the 13th, 1876, and the lowest, 53, on the 26th, 1885 and 1887. The highest mean monthly temperature, 73.2, occurred in 1876, and the lowest, 63.0, in 1885. The maximum temperature of the month, 98, occurred on the 30th, at Deer Lake. The lowest temperature, 31, occurred on the 11th, at Grayling. Frost was reported on the 5th, 6th, 7th, 9th, 10th, 11th, and 14th in the different sections of the state, but no material damage was done, except nipping some vines on the lowlands.

**Precipitation.**—The average rainfall for the state, 1.01, is 2.19 below the average of fourteen years. The rainfall was below the average in all sections, ranging from 0.52 in the upper peninsula to 2.73 in the central section. The average total rainfall for the lower peninsula was 0.79, which is 2.41 below the average. No county south of the straits received an average amount of rainfall during the month, and the rainfall for this month is the least amount on the records of this service. The following stations report an amount smaller in other years than is recorded this year: Grand Haven, 1883; Alpena, 1878; Marquette, 1873; Marshall, 1883. The average number of days on which 0.01 inch or more of rain fell is 4.7, while there were nineteen days in the upper peninsula, fifteen days in the northern section, thirteen in the central section, and eight in the southern section, thus showing the local character of the rainfall during the present month. The largest amount of rainfall recorded during the month, 4.44, was reported at Calumet, and the least, 0.07, at Ovid, being a difference of 4.37 between the greatest and the least. The same peculiarity was manifested in August, 1888, when the drought was prevailing, the largest rainfall for the month, 7.37, was recorded at Big Rapids, and the least, 0.10, was recorded at Cassopolis.

**Wind.**—Prevailing direction, southwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

#### MINNESOTA.

The mean temperature for the month was 2 above the August normal of eight to eighteen years. Although the first light frost of the season occurred earlier than usual (August 4th at Moorhead and Saint Vincent), the month was the warmest August in Minnesota since 1882. The average precipitation was 0.43 in excess of the normal. There was less than one-half the usual amount of rainfall in the western part of the state, the deficiency extending northward from Moorhead to Saint Vincent, where, at the latter-named station, the shortage was 16 per cent. The rainfall was normal and slightly above in the central and southeastern counties, while in the vicinity of Lake Superior it was double the usual quantity for August. The weather was generally favorable to all crops in the state, as is shown by the bountiful harvests.

#### SUMMARY.

**Temperature.**—Monthly mean, 68.4; highest monthly mean, 71.8, at Brainard; lowest monthly mean, 63.2, at Pokegama Falls; maximum, 99, at Grand Meadow and Saint Charles, 30th; minimum, 32, at Saint Vincent, 4th; range for state, 67; greatest local monthly range, 63, at Saint Vincent; least local monthly range, 35, at Lake Winnibigoshish; greatest daily range, 45, at Saint Vincent, 30th; least daily range, 5, at Duluth, 23d.

**Precipitation.**—Average for the state, 3.66; greatest, 7.87, at Duluth; least, 0.59, at Bowling Green.

**Wind.**—Prevailing direction, south.—*John Healy, Private, Signal Corps, Saint Paul, in charge.*

#### MISSISSIPPI.

#### SUMMARY.

**Temperature.**—The normal temperature for the state in August is 80; the mean for this August was 78.3, nearly 2.0 below the average. The mean daily temperature was below the normal on the 1st, rose to 2.0 above the normal on the 4th, continued about the normal from the 5th to the 10th, then gradually rose to 84 on the 15th, the warmest period of the month. A rapid fall to a mean of 73 occurred between the 15th and 18th. Throughout the central and southern parts of the state the temperature remained nearly normal from the 19th to the 22d, when it fell below the normal and continued so until the end of the month, averaging about 75 on the 31st. The daily range of temperature was quite uniform, being in value between 16 and 20 on 27 days in the month. There was a large amount of sunshine, the effects of which were somewhat counteracted by clear skies at night. The mean temperature was barely sufficient for the proper maturing of the cotton crop. The greatest local monthly range was at Columbus, from 104 on the 11th to 60 on the 17th, and the least at Pearlinton, from 91 on the 15th to 71 on the 30th. The highest monthly mean was at Columbus, 80.9, and the lowest at Corinth, 75. The highest and lowest temperatures recorded were at Columbus and Corinth, respectively.

**Precipitation.**—The average number of days on which rain fell was six, the actual number varying from thirteen at Logtown to one at Kosciusko. The average rainfall over the state was 2.71, being 1.25 less than the normal amount for August, 3.96. The deficiency in rainfall since January 1st is thus increased to 9.08. The heaviest rainfalls occurring in 24 hours were at University, 3.12, in 20 hours, 31st; at Logtown, 2.55, from 1 to 2 p. m., 15th; at Pearlinton, 3.74, from 12.30 to 1.30 p. m., 15th. Other heavy rains fell, as follows: Meridian, 1.84, on the 5th; Pontotoc, 1.73, on the 3d; Logtown, 1.65, on the 9th, from 2 p. m. to 2.30 p. m.; Pearlinton, 1.90, on the 5th; Agricultural College, 1.78, on the 31st.

**Wind.**—Prevailing direction, east or southeast.—*R. B. Fulton, Signal Corps, University, director.*

#### MISSOURI.

#### SUMMARY.

**Temperature.**—The mean temperature for August was 73.6. The highest temperature reported was 101, at Protem, and the lowest, 52, at Ozark. The average of maximum temperatures was 92.7, and the average of minimum temperatures was 57.7, making an average range of 35. The highest temperatures occurred on the 9th, 28th, 29th, and 30th, and the lowest on the 2d, 4th, 5th, 6th, 10th, 15th, 21st, 22d, 23d, 25th, and 26th.

**Precipitation.**—The average precipitation was 1.99, which was 0.85 below the August normal. The greatest amount of precipitation reported was 7.09, at Leavenworth, Kans., and 5.25, at Langdon, and the least, 0.10, at Ironton, and 0.30, at Kirksville. In the state, as a whole, precipitation occurred on fourteen days. The greatest number of days of precipitation in any one place was seven at Conception, Kansas City, Oregon, and Ozark.—*Prof. Francis E. Nipher, Saint Louis, director.*

#### NEBRASKA.

The month of August has been rather cool and cloudy, with a fair amount of rainfall over the state generally, and a very heavy precipitation in the extreme southeast.

#### SUMMARY.

**Temperature.**—The mean for the month in southeastern Nebraska was 72.8, which is about 1 below the normal; maximum, 105, at Kimball; minimum, 40, at Fort Robinson. This maximum is an unusual one for August, but the minimum in 1888 was 34, and in 1887, 38.

**Precipitation.**—The greater part of the state has had between one and two inches of rain; the extreme northwest over 3, and the region from the Blue River to the Missouri generally over 6, reaching a maximum of 12.10 at Tecumseh. The number of rainy days, however, was below the normal in the southeastern part of the state, and indeed over the state generally, the rainfall occurring mostly in one heavy rain throughout the southeast. The month has been favorable for crops generally.—*Prof. Goodwin D. Sweeney, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

#### NEVADA.

#### SUMMARY.

**Temperature.**—The temperature during the past month was about normal. The mean temperature for the state, 73.2, is only 0.9 lower than that of the same month last year. The atmosphere was generally smoky and hazy all through the month. The hottest monthly mean temperature, 95.5, is that of El Dorado Canyon, and the coldest monthly mean, 62.0, at Ely. There were two warm periods, the first from the 1st to the 3d, and the second from the

14th to the 16th. The majority of the lowest temperatures recorded occurred during the cold period of the 18th to the 20th. The highest maximum temperature for the state, 117.3, occurred at El Dorado Canyon, and the lowest minimum, 29.0, occurred at Elko, 29th. The range for the state is 88.3.

**Precipitation.**—The disastrous drought was broken in portions of Eureka and Elko counties, in Esmeralda, Nye, White Pine, and Lincoln counties, but still continues in other counties. Rain fell at 13 out of a total of 28 stations, with an average rainfall for the state, this year, of 1.06, which is 0.45 more than that of the same month in 1888. Thunder-storms were frequent at Belmont, Nye Co., and Pioche, Lincoln Co., and were attended with heavy rainfall. Frosts occurred at Crane's Ranch and at Ruby Hill on the 20th, and at Pioche on the 29th, doing little damage. The supply of water for irrigation and milling purposes is short all over the state.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

#### NEW ENGLAND METEOROLOGICAL SOCIETY.

The weather in New England during August was remarkable for several peculiarities, the most noticeable of which was the distribution of rainfall. There was a deficiency of about two inches in the northern part of the district, although rain fell on a greater number of days there than in the southern part; in southern New England the amount was about normal, 4.50, and all but a very small part of it fell on five days, the 1st, 3d, 5th, 9th, and 14th. After a period of frequent rainfalls during the first fifteen days a dry spell set in on the 16th and continued for the remainder of the month, broken only by a few scattered showers of light rain in the three northern, and light general rains on the 23d and 24th in the three southern states.

##### SUMMARY.

**Temperature.**—Monthly mean, 66.2 (104 stations); highest monthly mean, 70.2, at Holyoke; lowest monthly mean, 58, at West Jonesport; maximum, 94, at Lunenburg, 28th; minimum, 35, at Berlin Falls, 8th; range for New England, 59; greatest local monthly range, 52, at Berlin Falls; least local monthly range, 21, at Nantucket; greatest daily range, 43, at Jacksonville, 28th; least daily range, 0, at Long Plain, 3d. The average temperature for August for 22 stations, having records for more than ten years, is 67.9; the average for August, 1889, is 66.1; departure, -1.8.

**Precipitation.**—Average for New England, 3.72 (123 stations); greatest, 11.05, at Nantucket; least, 1.00, at Berlin Mills. The average precipitation for August for 31 stations, having records for more than ten years, is 4.19; the average for August, 1889, is 3.74; departure, -0.45; 5.63 fell at Nantucket on the 14th.

**Wind.**—Prevailing direction, southwest (24 stations).—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; L. G. Schultz, Sergeant, Signal Corps, assistant.*

#### NEW JERSEY.

##### SUMMARY.

**Temperature.**—The mean temperature for August, 1889, 69.6, is 2.4 below the normal for the month and 2.9 below the average for the corresponding month of 1888. The warmest days of the month were the 2d, 8th, 9th, 20th, and 21st, when temperatures ranging from 84 to 95 were recorded. The coolest days were the 12th, 13th, 15th, 16th, 17th, 18th, 27th, 28th, and 30th, the temperature ranging between 45 and 58.

**Precipitation.**—The average precipitation for the state, 5.18, is 0.44 above the normal and 0.95 below the average for the corresponding month of 1888. One station reports a total exceeding 9.00; four exceeding 7.00; two exceeding 6.00; nine exceeding 5.00; nine exceeding 4.00; four exceeding 3.00, and one exceeding 1.00.

**Wind.**—Prevailing directions, southeast and southwest.—*Prof. George H. Cook, New Brunswick, director; E. W. McGann, Sergeant, Signal Corps, assistant.*

#### NEW YORK.

##### SUMMARY.

**Temperature.**—The highest temperature reported was 90, on the 21st, at New York City and Geneva; the lowest, 34, on the 29th, at Middleburgh. The mean temperature for the state was 65.2; the 21st being the hottest, and the 15th the coldest day. The greatest local monthly range of temperature was 54, at Middleburgh; the least, 12.7, at Setauket. The temperature was generally below the normal, excepting at Buffalo, Humphrey, and Setauket, where it was slightly above. Frost was reported on the 8th, 10th, 11th, 12th, 27th, 29th.

**Precipitation.**—Average for the state, 2.59. The rainfall was generally below the average, excepting at Friendship where it was 0.82, Rondout 0.15, Setauket 0.70, White Plains 0.11, and Albany 0.31, above. The greatest monthly rainfall was 4.78, at White Plains; the least, 0.64, at Eden Centre.

**Wind.**—Prevailing direction, southwest.—*Prof. E. A. Fuertes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

#### NORTH CAROLINA.

##### SUMMARY.

**Temperature.**—Monthly mean, 73.7; normal for August, 75.8; departure from the normal, -2.1; maximum, 96.0, at Kitty Hawk, 22d; minimum, 44.0, at Highlands, 17th; range for state, 52.0; highest monthly mean temperature, 76.6, at Kitty Hawk; lowest monthly mean, 62.0, at Highlands; average monthly range, 30.1; greatest monthly range, 38.0, at Clarkton; least monthly range, 17.0, at Hatteras.

**Precipitation.**—Average for the state, 5.34; normal for August, 5.61; departure from the normal, -0.27; greatest monthly, 9.40, at Washington; least monthly, 2.89, at New Berne. The rainfall was in excess in the eastern portion of the state, and deficient in the western portion. Rainfall of two inches or more, in twenty-four hours, occurred as follows: Hatteras, 2.87, 3d; Fayetteville, 2.21, 26th; Winslow, 2.00, 27th; Clarkton, 2.50, 27th; Raleigh, 2.15, 5th; Washington, 2.29, 3d.

**Wind.**—Prevailing direction, southwest. Average wind direction for August, from many years observation, southwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Hermann, Sergeant, Signal Corps, assistant.*

#### OHIO.

##### SUMMARY.

**Temperature.**—The mean temperature of the northern section was 67.7; of the middle section, 68.8; of the southern section, 70.7, and of the state, 69.1. These means are 0.5, 1.1, 0.9, and 0.8 below the seven-year averages for the sections and state for August. The maximum temperature, 99.5, occurred at Georgetown on the 31st, and the minimum, 40, at Ohio State University on the 15th. The monthly range of temperature was 23.3. The greatest daily range was 41.4, at Wauseon, 30th, and the smallest, 5.5, at Hiram, 9th.

**Precipitation.**—Precipitation was general in all sections on the 4th, 13th, and 14th; in the northern and middle sections on the 2d and 9th, and in the southern section on the 10th. Local rains occurred in all sections on the 5th, 16th, and 21st, and in the southern section on the 22d. The mean rainfall in the northern section was 1.88; in the middle section, 1.58; and in the southern section, 1.05. These means are 0.82, 1.76, and 2.45 below the averages for the sections for August. The mean for the state, 1.50, is 1.68 below the average for the past seven years, and is the smallest August rainfall since 1884. The deficiency in rainfall to September 1st amounts to 1.96 in the northern section, 6.05 in the middle section, and 7.42 in the southern section. The deficiency for the state is 5.14.

Light frost was reported at Poland on the 12th.

**Wind.**—Prevailing direction, southwest.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

#### PENNSYLVANIA.

##### SUMMARY.

**Temperature.**—The mean temperature was 67.4, which is 2.0 below the corresponding month of 1888, and about 3.0 below the normal. The greatest departures were in the agricultural districts of the Lehigh, Cumberland, and Lebanon valleys. The following reports show the highest temperatures recorded during the month: Tionesta, 100; Carlisle 95; Girardville, 95. The lowest were: Columbus, 37; Wellsborough, 38; Greenville, 38.7; and Honesdale, 39. At most stations the warmest days of the month were the 21st and 31st, and the coldest the 12th. Stations with the highest monthly mean temperature were: Carlisle, 72.9; Philadelphia, 72.8; Pottstown, 72.0; and Selin's Grove, 71.8. The lowest monthly mean temperatures were: Dyberry, 61.2; Honesdale, 62.0; and Philipsburgh, 62.0.

**Precipitation.**—The average rainfall for the state during the month was 3.24. Considered as a whole, this is about normal, but the distribution was very uneven, and some parts of the state suffered from drought. The following are the greatest monthly totals: Philadelphia, 7.07; Catawissa, 6.17; Girardville, 6.03; Pottstown, 5.05; West Chester, 4.43; Reading, 4.46. The least were: Wellsborough, 0.83; Charlesville, 1.06; Hollidaysburgh, 1.37; Altoona, 1.62; and Pittsburgh, 1.88. With but few exceptions, very little rain fell after the middle of the month. Up to this time showers were frequent.

**Wind.**—Prevailing direction, west.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

#### SOUTH CAROLINA.

##### SUMMARY.

**Temperature.**—The monthly mean, 74.4, is 2.3 above the normal of the last three years. Highest monthly mean, 79.0, at Hardeeville; lowest monthly mean, 68.5, at Brewer Mine; maximum, 97.0, at Chester, 6th; minimum, 45.0, at Brewer Mine, 27th; range for state, 52.0. In most instances the maximum temperature occurred on the 10th and 11th, and the minimum temperature on the 19th.

**Precipitation.**—The average for the state, 6.37, is 0.56 above the average of the last three years. Greatest monthly, 11.89, at Florence; least monthly, 1.73, at Yorkville; greatest daily, 3.74, at Winnsborough, 2d. Average number of rainy days, 12.3.

**Wind.**—Prevailing direction, southeast.—*Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.*

#### TENNESSEE.

The month was devoid of any special meteorological features. With the exception of the slightly low ranges of temperatures, the conditions were generally near the normal for the month.

##### SUMMARY.

**Temperature.**—The mean temperature was 73.8, a little below the normal for the past seven years, and the lowest August mean during the period, except in 1883 and 1884. The highest monthly mean was 82.3, at Bolivar, and the lowest was 68.2, at Fostoria. The highest temperature observed was 96, on the 21st, at Bolivar, and was the lowest August maximum noted during the past seven years, the next lowest being 98, in 1883. The lowest tempera-



ture observed was 51, on the 16th, at Andersonville. This was the highest August minimum reported during the period named, except 52, in 1886. The highest temperature was recorded generally on the 20th, 21st, and 22d in the eastern division; on the 9th, 10th, and 21st in the middle division, and on the 14th in the western division. The lowest temperature was generally recorded on the 16th and 17th. The daily ranges of temperature were about the normal.

**Precipitation.**—The average depth of rainfall was 3.37, a little less than the August average for the past seven years. Of this amount the eastern division received an average of nearly 4.00; the middle division nearly 3.50, and the western division nearly 2.75. Rains were variously reported throughout the state on twenty-three days, and on six of these, viz., 4th, 11th, 13th, 14th, 22d, and 31st, the rains were general. The day of the greatest rainfall was the 14th. The rains were generally pretty well distributed, and only a few heavy local daily falls were reported. Those measuring over 2.00 were: 2.20, on the 5th, at Cog Hill; 2.01, on the 3d, at Rugby; 2.60, on the 11th, at Ashwood; the greatest during the month, 2.27, on the 14th, at Hohenwald; 2.45, on the 14th, at Savannah; and 2.33, on the 31st, at Memphis. Many of the rains were light and local in character. There were eight days on which no measureable rainfall was noted. During the latter half of the month until the 31st there was but little rainfall noted, and of this period, five days, 16th to 20th, inclusive, were rainless. The greatest monthly rainfall was 7.35, at Clinton. Other large monthly amounts are noted, as follows: 6.42 at Knoxville, 5.12 at Rugby, 5.86 at Lewisburgh, 6.70 at Ashwood, 5.65 at Hohenwald, 5.62 at Memphis, and 5.60 at Strawberry Plains. The least monthly rainfall was 0.55, at McKenzie. This was the least August rainfall during the past seven years, except in 1883, when only 0.03 was reported, also at McKenzie. Most of the rains during the month were accompanied by electrical disturbances, some of them quite severe, but with no very high winds.

**Wind.**—Prevailing direction, south and southwest.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

## TEXAS.

## SUMMARY.

**Temperature.**—Over the Pan Handle and the extreme western portion of the state the mean temperature for the month was about 2 above the normal. Over the eastern portion of the state the temperature was about normal, while in the southwestern portion the mean for the month was about 1 below the normal, except at Brownsville, where the normal prevailed. The greatest excess in temperature occurred at Silver Falls, where the mean was 7 below the normal for the month, and the greatest deficiency at Corpus Christi, where the mean was 2 below the normal for the month. Monthly mean temperature for the state, 81; highest maximum, 104, at Pecos City, 16th and 17th; lowest minimum, 41, at Hartley, 12th. There were two warm periods, one from the 1st to 3d, and the other from the 14th to the 17th; two cool periods, one from the 9th to 12th and the other from the 24th to 27th.

**Precipitation.**—The rainfall during the month was very unevenly distributed over the state, and was generally from one to two inches below the normal, except along the eastern half of the coast, and in the vicinity of San Antonio, New Braunfels, La Grange, Dallas, and Brownsville, where an excess is reported. Over about one-third of the agricultural portion of the state the total rainfall during the month was less than one-half inch.—D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

**Meteorological record of Army post surgeons, voluntary, and other co-operating observers, August, 1889.**

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>Alabama.</b>	0	0	0	Ins.	<b>Arizona—Cont'd.</b>	0	0	0	Ins.
Bermuda f.....	90	63	75.4	0.24	Fort Apache.....	96	52	74.1	2.62
Citronelle f.....	96	55	80.0	2.08	Fort Bowie.....	97	52	79.7	0.35
Columbiana f.....	92	55	75.4	3.83	Fort Huachuca.....	95	57	76.9	1.80
Decatur (1) f.....	92	56	76.0	3.88	Fort Lowell.....	108	66	86.4	2.07
Decatur (2) f.....	92	56	76.0	4.91	Fort McDowell.....	117	71	92.8	0.29
Eufaula.....	94	62	77.2	1.97	Fort Mojave.....	116	67	93.8	0.74
Evergreen f.....	96	61	77.2	2.05	Fort Verde.....	106	62	83.4	0.75
Fort Deposit f.....	95	61	78.2	5.03	Gila Bend.....	111	78	96.1	1.03
Livingston (1) f.....	89	73	79.9	2.35	Globe.....	102	55	83.7	1.19
Livingston (2) f.....	92	58	77.4	1.07	Holbrook.....	99	56	79.2	1.20
Marion f.....	94	56	75.2	2.26	Lochiel.....	94	57	76.0	1.67
Mesa f.....	90	61	77.4	2.00	Maricopa.....	115	70	92.8	0.90
Mt. Vernon B'ks.....	96	61	79.0	1.13	Mount Huachuca.....	109	62	80.8	0.54
Opelika f.....	96	62	76.8	2.03	Pantano.....	105	71	87.2	2.42
Pine Apple f.....	94	56	76.7	0.23	Prescott Junction.....	104	46	75.6	2.77
Selma f.....	95	62	79.7	7.45	San Carlos.....	111	55	86.9	0.65
Scottsborough f.....	94	60	77.4	1.32	San Simon.....	110	70	81.5	0.98
Tusculum f.....	92	56	75.6	1.99	Signal.....	112	73	91.8	1.41
Valley Head f.....	90	51	71.2	3.45	Strawberry.....	109	61	81.8	0.10
Wiggins A.....	97	60	81.0	1.01	Teviston.....	100	52	76.0	1.17
<b>Arizona.</b>					Tip Top.....	103	63	77.9	2.03
Antelope Valley.....				2.29	Tombsone.....	104	63	77.9	2.06
Ash Creek.....				0.47	Tucson (1).....	106	85	93.5	1.00
Ash Canyon.....				0.20	Tucson (2).....	99	40	68.8	0.70
Bahari's.....	104			2.40	Volunteer Springs.....	89	40	63.8	4.00
Benson.....	101	74	87.6	0.94	Willow Springs.....				2.41
Bisbee.....				0.73	Winslow.....	97	52	75.6	1.10
Buckeye.....				0.51	Yuma.....	108	86	94.3	0.66
Casa Grande.....	114	79	93.7	0.00	<b>Arkansas.</b>				
Cedar Springs.....				3.60	Arkansas City f.....				1.86
Cooley's Springs.....				2.95	Camden f.....	92	61	79.0	1.51
Curtis.....				5.42	Conway.....	92	61	75.3	2.12
Flagstaff.....	89	64	66.5	0.65					

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Arkansas—Cont'd.					California—Cont'd.				
Dallas †	89	70	80.4	Ins.	Los Angeles*	104	60	73.5	Ins.
Dardanelle†				2.85	Los Banos*	111	63	82.3	0.00
Dayton†	95	62	77.2	2.02	Los Gatos*	97	55	70.6	0.00
Devall's Bluff†	96	54	74.0	4.60	Mammoth Tank*	119	81	98.8	0.00
El Dorado†	89	58	74.7	1.11	Martinez*	86	56	70.0	0.00
Forrest City†	92	56	75.5	3.45	Marysville*	96	60	78.8	0.00
Heber	96	57	73.6	1.88	Menlo Park*	88	50	67.9	0.00
Helena (1)†				2.14	Merced*	108	58	81.5	0.00
Helena (2)†	94	58	77.1	2.50	Modesto*	105	65	81.1	0.00
Hot Springs	96	52	75.5	2.05	Mojave*	108	67	86.5	0.81
Lead Hill	101	59	77.1	4.65	Montague*	100	74	86.4	0.00
Little Rock B'ks.	97	59	77.6	2.66	Monterey*	77	57	64.4	0.00
Lonoke	93	62	78.2	3.37	Monterey* (Hotel				
Malvern†	98	52	77.3	1.88	del Monte)	78	50	62.5	0.00
Monticello†	94	62	78.2	1.88	Mount Hamilton.	92	51	70.4	0.00
Newport (1)†				5.55	Napa*	90	50	65.9	0.00
Newport (2)†	94	58	75.8	2.22	National City†	96	60	72.3	0.09
Osceola†	94	58	73.7	2.64	Needles	117	70	97.0	1.27
Ozone†	87	60	73.8	3.29	Newark*	88	56	68.6	0.00
Pine Bluff†	94	62	78.6	2.06	Newhall*	110	55	79.2	0.36
Prescott†	92	62	77.6	0.23	Newman*	107	60	82.7	0.00
Russellville†	96	59	77.0	3.30	Niles*	92	49	68.0	0.00
Stuttgart†	93	57	75.8	1.80	Norwalk	99	60	73.5	0.00
Texarkana†	98	60	80.2	0.08	Oakland (1)*	79	51	61.0	0.00
Washington†	94	58	77.2	1.30	Oakland (2)*	74	54	61.1	0.00
Winslow	87	55	72.9	1.41	Orland*	105	62	84.5	0.00
British Columbia.					Oroville	99	58	79.4	0.00
New Westminster.	84	48	61.8	3.13	Pajaro*	81	55	63.3	0.00
California.					Paso Robles*	101	47	71.5	0.00
Alcade*	110	65	85.7	0.00	Petaluma*	94	51	66.1	0.00
Alcatraz Island	67	50	56.5	0.00	Placerville*	102	55	74.5	0.00
Almaden*	95	57	72.2	0.00	Pomona*	96	64	78.4	0.00
American Hill*	100	60	71.8	0.00	Porterville*	110	74	89.9	T.
Anaheim*	100	63	77.9	T.	Presidio of San F.	77	47	56.8	0.00
Anderson†	110	60	82.7	0.00	Puente*	103	61	74.9	0.50
Angel Island.	84	48	61.4	0.00	Red Bluff*	105	62	81.1	0.00
Aptos*	85	50	61.9	0.00	Redding*	105	62	82.0	0.00
Athlone*	114	60	82.6	0.00	Rocklin*	108	59	80.8	0.00
Bakers*	101	59	76.4	0.00	Rumsey*	105	68	82.9	0.00
Bakersfield*	111	56	86.5	0.00	Sacramento (1).	92	45	67.1	0.00
Barstow	109	57	85.6	0.13	Sacramento (2)*	94	60	73.6	0.00
Benicia Barracks.	97	51	70.0	0.00	Salinas (1)*	76	52	58.6	0.00
Berendo*	110	60	82.6	0.00	Salinas (2)*	73	52	60.0	0.00
Berkeley	79	51	56.4	0.00	Salton*	117	74	95.6	0.30
Bishop Creek*	109	73	87.6	0.00	Sanger Junction*	110	67	86.3	T.
Borden*	111	60	81.6	0.00	San Ardo*	106	52	69.6	0.00
Brentwood*	102	62	79.5	0.00	San Diego B'ks	89	63	72.0	0.00
Brighton*	106	59	77.2	0.00	San Fernando*	108	52	80.6	0.00
Byron*	102	66	79.7	0.00	San Gabriel*	100	60	76.7	0.89
Cactus*	122	78	97.4	0.25	San Jose*	89	52	67.2	0.00
Caliente*	106	70	85.9	0.00	San Mateo*	82	50	72.0	0.00
Calistoga*	102	50	68.6	0.00	San Miguel*	104	54	73.5	0.00
Castroville*	73	52	61.2	0.00	San Pedro*	89	63	74.6	0.00
Centreville*	96	58	70.5	0.00	Santa Ana*	100	60	73.7	0.66
Chico*	115	65	85.1	0.00	Santa Barbara (1).	91	53	67.3	0.00
Cisco	85	45	63.7	0.00	Santa Barbara (2)*	88	60	70.5	0.00
Colgrove				0.50	Santa Clara*	88	47	66.3	T.
Colfax*	100	59	76.4	0.00	Santa Cruz*	86	52	65.2	0.00
Colton*	111	60	80.3	T.	Santa Margarita*	99	50	72.3	0.00
Corning*	106	56	82.0	0.00	Santa Maria.	92	47	65.6	0.00
Crescent City				0.10	Santa Monica*	89	63	70.0	0.11
Davisville*	107	56	80.5	0.00	Santa Paula*	92	55	71.8	0.01
Delano*	108	68	87.3	0.00	Santa Rosa*	86	45	64.7	0.00
Delta*	103	54	75.5	0.00	Selma*	110	68	83.6	0.00
Downey*	93	59	71.3	0.00	Seven Palms*	120	75	97.9	0.07
Dunnigan*	96	58	77.8	0.00	Shingle Springs*	103	64	80.6	0.00
El Dorado*	104	62	80.5	0.00	Sims*	100	48	70.1	0.00
Elmira*	110	58	76.5	0.00	Sisson*	98	59	69.5	0.00
El Verano	96	50	66.6	0.00	Soledad*	94	46	61.8	0.00
Emigrant Gap*	88	51	66.5	0.00	Soquel*	88	52	66.2	0.00
Esperanza*	105	55	78.9	0.00	South Side*	106	56	79.0	0.38
Farlington*	107	59	78.8	0.00	South Vallejo*	75	51	60.0	0.00
Felton*	96	48	65.8	0.00	Spadra*	109	58	75.6	0.00
Florence*	93	58	71.2	0.89	Steeles	92	48	64.9	0.00
Folsom*	104	58	81.0	0.00	Stockton (2)*	96	58	73.2	0.00
Fort Bidwell	95	38	71.0	0.00	Summit*	98	40	60.8	0.00
Fort Gaston	98	36	65.8	0.00	Suisun City*	103	58	72.7	0.00
Fort Mason	75	48	58.7	0.00	Susville†	95	49	74.0	0.00
Fresno*	112	65	85.8	0.00	Tehachapi*	90	62	78.3	0.80
Fruito*	109	66	84.5	0.00	Tehama*	102	65	79.7	0.00
Georgetown	97	54	74.9	0.00	Templeton*	105	49	73.3	0.00
Gilroy*	100	52	69.1	0.00	Towles*	94	45	75.3	0.00
Girard*	100	60	77.2	0.35	Tracy*	108	62	81.9	0.00
Glen Ellen*	101	49	67.7	0.00	Traver*	101	69	83.3	0.00
Goshen*	108	62	83.5	0.00	Tropico*	100	53	72.5	0.30
Hollister*	101	52	68.5	0.00	Truckee*	90	42	69.2	0.00
Hydesville†	76	42	58.4	0.20	Tulare*	110	65	86.3	0.00
Indio*	116	80	97.4	0.95	Turlock*	107	62	82.2	0.00
ione*	102	58	75.3	0.00	Vacaville (1)*	103	56	75.5	0.00
olon*	109			0.00	Vacaville (2)*	104	57	73.1	0.00
ulian*†	100	61	81.8	0.60	Valley Springs*	101	65	81.2	0.00
Keeler*	100	68	80.6	T.	Vina*	103	59	76.9	0.00
Keene*	103	57	76.0	0.28	Volcano Springs*	126	78	102.5	0.00
Kingsburgh*	100	65	82.7	0.00	Walla Walla Creek.	92	49	68.8	0.00
King City*	105	48	65.4	0.00	Walnut Creek	102	46	71.5	0.00
Knight's Landing.	96	60	78.4	0.00	Wheatley*	105	60	81.3	0.00
La Grange	114	50	83.5	T.	Whittier*	101	63	76.7	0.95
Lathrop*	106	58	72.0	0.00	Williams*	112	64	88.2	0.00
Laurel*	101	50	68.6	0.00	Willow (1)*	109	52	76.6	0.00
Lemoore*	106	62	83.6	0.00	Willow (2)*	109	61	79.7	0.00
Lewis Creek*	99	65	86.7	T.	Winters*	105	61	84.9	0.00
Livermore*	98	50	67.8	0.00	Canada.				
Livingston*	109	60	82.5	0.00	McGill Col. Obser-				
Long Beach*	97	63	71.8	0.00	vatory, Montreal.	81	50	65.0	2.73



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>Colorado.</b>	°	°	°	Ins.	<b>Florida—Cont'd.</b>	°	°	°	Ins.
Alma.....	76	34	52.0	3.45	Alva.....	97	68	79.3	11.78
Breckenridge.....	87	25	56.3	0.86	Archer.....	98	61	81.5	7.48
Canon City.....	102	59	75.5	2.09	Fort Barrancas.....	92	67	80.0	6.77
Climax.....	88	35	51.5	1.63	Fort Meade.....	88	73	80.5	5.78
Coulter.....	105	59	79.9	1.21	Homeland.....	93	72	80.6	5.90
Delta.....	105	59	79.9	0.61	Kissimmee City.....	96	69	80.7	13.03
Dolly Varden Mine.....	62	28	42.0	1.06	Lake City.....	95	52	78.1	9.37
Durango.....	100	47	73.5	1.40	Live Oak.....	98	62	79.4	14.03
Eagle Venn.....	100	47	73.5	1.05	Manatee.....	93	72	81.1	9.66
Elkhorn.....	100	47	73.5	1.05	Matanzas.....	93	72	79.0	1.51
Fort Collins.....	97	41	69.3	0.95	Merritt's Island.....	90	71	78.8	6.95
Fort Crawford.....	95	45	71.0	1.35	St. Francis B'ks.....	90	68	78.0	4.91
Fort Lewis.....	97	39	65.7	1.07	Tallahassee.....	89	64	77.8	4.75
Fort Logan.....	100	44	73.7	0.53	Villa City.....	95	73	79.2	7.77
Fort Lyon.....	106	47	77.1	1.06	<b>Georgia.</b>				
Fraser.....	79	42	61.8	1.33	Albany.....	96	61	79.4	4.28
Georgetown.....	81	46	62.8	1.31	Allapaha.....	93	62	78.5	6.47
Glenwood Springs.....	102	41	71.0	0.41	Andersonville.....	108	53	72.7	4.80
Grand Lake.....	83	37	57.1	2.22	Athens (1).....	90	63	74.0	9.08
Greeley.....	97	44	72.9	1.09	Athens (2).....	94	58	76.2	4.33
Gunnison.....	100	41	70.6	0.82	Bainbridge.....	98	62	80.6	4.23
Husted.....	99	41	70.6	0.78	Camak.....	92	60	76.2	3.13
Idaho Springs.....	100	41	70.6	1.26	Cartersville.....	90	60	75.3	4.30
Julesburg.....	100	43	76.8	1.12	Diamond.....	92	62	70.8	15.56
Kremmling.....	90	50	63.6	0.53	Duck.....	82	55	69.6	6.29
La Porte.....	100	47	73.5	0.73	Eastman.....	98	60	82.6	6.76
Leadville.....	75	38	54.9	1.58	Forayth.....	92	70	77.4	5.50
Livermore.....	100	47	73.5	1.33	Fort Gaines.....	100	64	82.6	3.82
Middle Box Elder.....	89	38	64.3	0.39	Fort McPherson.....	91	59	74.7	10.85
Monte Vista.....	96	44	67.6	0.41	Gainesville.....	88	60	73.0	8.41
Palmer Lake.....	96	44	67.6	2.67	Gillville.....	87	64	76.0	8.00
Paoli.....	100	47	73.5	2.89	Griffin.....	90	62	70.0	8.00
Pike's Peak.....	81	32	43.0	1.92	Hephzibah.....	88	68	77.0	8.70
Ranch near Como.....	81	37	54.8	1.02	Jesup.....	97	60	79.3	9.13
Rifle Falls.....	102	42	72.9	1.28	Macon.....	92	60	77.7	4.85
Rocky Ford.....	100	44	73.2	1.32	Marietta.....	85	59	71.8	6.68
Saguache.....	90	44	63.8	1.40	Milledgeville.....	90	60	75.8	4.29
San Luis Ex. Sta.....	100	44	63.8	0.45	Millen.....	95	55	78.0	6.70
San View.....	100	44	63.8	0.52	Newnan.....	88	60	74.2	7.49
T. S. Ranch.....	95	40	74.9	0.77	Point Peter.....	67	35	54.0	8.40
Thon.....	94	35	69.2	2.76	Quitman (2).....	96	64	80.4	2.00
Upper Pine.....	100	47	73.5	1.56	Smithville.....	98	56	78.4	3.22
<b>Connecticut.</b>					Thomasville (1).....	92	62	78.6	5.69
Birmingham.....	81	31	55.5	5.55	Thomasville (2).....	94	62	79.5	4.65
Canton.....	84	43	63.7	3.71	Toccoa.....	88	60	74.5	10.17
Clark's Falls.....	85	50	67.6	4.40	Union Point.....	90	60	74.8	8.87
Colchester.....	85	50	67.6	2.60	Washington.....	88	62	76.0	3.64
Falls Village.....	88	53	70.9	4.21	Way Cross.....	92	66	80.0	5.01
Fort Trumbull.....	88	53	70.9	3.12	Waynesborough.....	90	62	74.8	5.50
Hartford (1).....	86	44	68.1	3.11	West Point.....	92	66	78.7	5.50
Hartford (2).....	86	44	68.1	3.11	Woolley's Ford.....	86	62	72.1	.....
Lebanon.....	81	31	55.5	5.04	<b>Idaho.</b>				
Manassett.....	81	48	64.9	3.78	Boia's Barracks.....	100	45	72.3	0.26
Middleton.....	83	49	66.4	5.12	Era.....	96	38	69.2	0.10
New Britain.....	83	49	66.4	3.17	Fort Sherman.....	86	38	63.7	0.24
New Hartford (1).....	84	46	60.9	3.34	Kootenai.....	88	38	60.0	0.58
Newington.....	84	46	60.9	3.34	Lewiston.....	95	52	75.0	0.27
North Woodstock.....	84	46	60.9	3.34	Soda Springs.....	92	42	63.4	2.02
Pomfret.....	84	46	60.9	3.34	<b>Illinois.</b>				
South Manchester.....	84	46	60.9	3.34	Atwood.....	94	52	71.0	1.39
Thompson.....	80	49	65.9	4.04	Beardstown.....	88	51	69.7	0.30
Uncasville.....	80	49	65.9	4.04	Beason.....	88	51	69.7	0.30
Vernon Centre.....	82	54	66.5	3.13	Belvidere.....	94	51	69.4	0.62
Voluntown.....	82	54	66.5	3.13	Brush Hill.....	96	61	73.9	1.17
Wallingford.....	85	45	67.0	3.42	Cedarville.....	91	56	69.7	0.37
West Simsbury.....	85	45	67.0	3.42	Centralia.....	92	59	76.0	1.53
<b>Dakota.</b>					Charleston.....	92	53	70.9	1.53
Alexandria.....	98	42	71.7	3.81	Collinsville.....	90	56	73.1	1.85
Armour.....	97	52	71.0	1.80	Dwight.....	98	45	71.1	0.89
Brookings.....	97	42	70.0	0.72	Fairfield.....	92	60	75.7	1.75
Canton.....	96	49	73.1	3.09	Flora.....	89	50	70.0	2.00
Carrington.....	99	40	68.2	2.37	Fort Sheridan.....	95	46	68.6	0.31
Clark.....	100	48	70.5	2.37	Golconda.....	90	63	75.0	1.57
Davenport.....	95	38	70.4	0.38	Grand Tower.....	90	63	75.0	1.57
De Smet.....	104	62	70.1	4.40	Greenville.....	94	53	71.7	0.58
Fort A. Lincoln.....	104	48	70.7	0.65	Griggsville.....	92	61	76.0	0.76
Fort Bennett.....	104	48	70.7	0.65	Hennepin.....	95	47	69.6	0.75
Fort Buford.....	99	42	73.4	0.98	Irishtown.....	91	60	73.8	1.09
Fort Meade.....	100	47	70.8	0.00	Jordans Grove.....	90	57	73.2	3.59
Fort Pembina.....	97	33	67.2	2.34	Lacon.....	94	57	72.9	0.15
Fort Randall.....	107	49	70.4	1.54	Lake Forest.....	90	49	67.9	0.71
Fort Sully.....	107	49	70.4	1.54	Lanark.....	92	54	67.9	0.38
Fort Totten.....	107	49	70.4	1.54	Louisville.....	91	57	71.5	2.56
Fort Yates.....	107	49	70.4	1.54	Mascoutah.....	90	55	72.0	1.20
Gallatin.....	98	42	69.2	0.28	Mattoon.....	93	54	71.1	1.87
Kimball.....	99	48	69.8	1.76	McLeansborough.....	96	54	72.8	3.02
Napoleon.....	105	43	70.9	1.74	Mount Carmel.....	95	52	71.5	0.70
New England City.....	101	37	71.0	0.70	Mount Morris.....	95	52	71.5	0.70
Onida.....	108	42	74.2	0.51	Olney.....	91	59	70.5	3.32
Roscoe.....	108	41	70.0	0.51	Oneida.....	98	60	72.2	0.50
Spring Lake.....	100	49	74.4	0.51	Oswego.....	94	49	68.6	0.75
Steele.....	110	39	72.0	0.44	Ottawa.....	91	59	71.4	2.00
Wahpeton.....	96	38	70.1	1.39	Palestine.....	90	54	70.8	2.95
Webster.....	100	42	73.5	0.67	Pana.....	90	54	74.1	0.68
Wolsey.....	96	43	71.2	0.62	Peoria (1).....	90	55	71.0	1.27
Woonsocket.....	99	41	71.9	0.62	Peoria (2).....	93	55	73.4	1.23
<b>Delaware.</b>					Philo.....	98	48	72.9	0.84
Kirkwood.....	62	74.0	.....	.....	Quincy.....	98	35	74.6	1.65
<b>District of Columbia.</b>					Richview.....	91	54	72.8	1.04
Washington B'ks.....	91	55	73.6	3.80	Riley.....	91	51	68.1	0.77
<b>Florida.</b>					Rockford.....	92	47	69.8	0.74
Altamonte Springs.....	94	60	80.0	7.40	Rock Island Arsenal.....	92	54	71.7	1.07
					Sandwich.....	92	55	72.0	0.79
					South Evanston.....	93	45	67.2	0.88

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>Illinois—Cont'd.</b>	°	°	°	Ins.	<b>Kansas—Cont'd.</b>	°	°	°	Ins.
Sycamore*	92	48	67.6	0.86	Allison*	95	50	74.6	1.66
Warsaw†	92	48	67.6	0.15	Arlington	95	50	74.6	0.70
Wataeka	92	47	68.7	2.01	Atwood†	98	62	76.6	3.25
White Hall	94	60	76.4	1.04	Augusta	98	62	76.6	4.36
Windsor†	90	52	73.5	1.93	Belleville*	90	58	72.8	2.26
Winnebago	98	56	72.1	0.10	Bendena*†	105	60	73.0	5.70
<b>Indiana.</b>					Brookville.	105	60	73.0	3.30
Angola	92	50	73.1	0.91	Bucklin	106	64	76.2	1.40
Blue Lick	88	58	72.6	0.47	Buffalo Park	106	64	76.2	0.95
Butlerville*	92	50	73.1	0.48	Bunker Hill	104	62	76.2	2.62
Cannelton	92	59	75.1	1.18	Burr Oak	93	45	73.7	1.70
Columbia City	93	47	65.9	1.46	Carneiro	96	62	76.2	1.90
Columbus	89	55	69.5	0.16	Cawker City	91	60	76.7	2.60
Connersville	89	55	72.9	0.24	Cold Water	98	56	81.0	0.95
Dana*	93	55	72.4	1.05	Collyer	96	49	74.7	2.10
Delphi	89	46	68.4	0.68	Conway	94	53	75.3	2.07
De Gonia Springs	86	55	72.3	1.32	Cunningham*	99	67	75.3	0.60
Evansville†	86	55	72.3	1.43	Dorrance	100	67	75.3	2.25
Farmland	90	52	71.9	1.08	Dwight	94	55	72.3	2.81
Huntersville*	91	59	70.4	2.00	Elco	97	60	78.0	2.16
Huntingburg	90	59	74.4	2.00	Elk Falls†	98	49	71.0	2.80
Huntington†	90	54	73.5	0.31	Ellis (1)	94	68	75.0	5.00
Jeffersonville	90	54	73.5	0.31	Ellis (2).	100	57	78.5	.....
La Fayette	93	50	68.3	3.53	Ellsworth*	94	62	74.0	2.19
Logansport†	90	54	73.5	0.31	Emporia	96	60	79.0	3.18
Marengo	93	58	73.6	1.67	Englewood*	101	46	76.5	3.28
Marion	90	48	71.9	0.50	Fort Hays	91	56	73.5	4.97
Maury*	91	43	66.2	0.29	Pt. Leavenworth(1)	91	59	73.9	4.77
Mount Vernon(1)†	89	57	72.0	2.26	Fort Riley	94	55	74.5	4.00
Mount Vernon(2)	89	57	72.0	2.26	Fort Scott	103	42	77.9	3.09
New Providence*	89	51	71.8	0.49	Fremon†	106	45	78.6	3.69
Point Isabel*	96	55	70.0	0.88	Gibson	103	42	77.9	3.09
Princeton†	93	55	73.0	1.55	Globe*	89	62	73.4	4.74
Richmond	90	48	68.8	1.41	Gognac	98	68	.....	2.50
Rockville	90	54	69.6	1.35	Gorham	99	56	.....	2.50
Rushville†	89	54	69.6	0.47	Grainfield	99	62	75.7	4.20
Scalesville*	92	59	75.0	1.18	Grenola	108	60	86.6	2.50
Seymour	87	48	68.6	0.22	Grinnell	94	55	74.8	2.54
Sunman†	89	43	69.0	0.36	Halstead	96	53	74.9	3.00
Vevay	91	54	72.4	0.02	Haven	88	67	73.2	2.63
Vincennes†	87	58	69.7	0.96	Havensville*	93	57	73.2	4.87
Worthington	87	58	69.7	0.96	Hays City	98	54	75.8	0.37
<b>Indian Territory.</b>					Horton	93	57	73.2	4.87
Caddo Creek*†	98	64	78.0	.....	Independence*	98	54	75.8	0.37
Cantonment†	98	64	78.0	2.86	Junction City	98	62	75.8	3.11
Eufaula†	98	64	78.0	3.68	Kanapolis	98	62	75.8	1.10
Fort Gibson	96	55	77.1	0.65	Kirwin†	98	62	75.8	1.10
Fort Reno	100	56	77.4	4.88	Kellogg	98	62	75.8	1.10
Fort Sill	104	57	78.0	3.82	La Harpe*	66	73.6	1.48	
Fort Supply	103	57	79.0	3.45	Lakin	89	57	72.7	4.24
Healdton*	100	66	84.9	6.07	Lawrence	98	53	75.8	2.69
Jimtown*†	100	62	79.6	5.42	Lebo	93	59	74.8	3.41
Lehigh*	100	64	79.6	3.47	Lincoln	104	58	84.6	1.75
Oklahoma City†	100	56	76.8	3.56	Luray	97	50	77.0	.....
Tulsa†	100	56	76.8	0.80	Macksville*	97	50	77.0	.....
<b>Iowa.</b>					Manhattan(1)†	97	51	74.1	2.77
Amana†	91	47	70.2	1.19	Manhattan(2)	97	51	74.1	2.46
Ames*	94	47	71.4	0.87	Manhattan(3)*	98	56	75.5	2.75
Bancroft*	94	60	72.6	0.12	Marmaton	94	56	75.5	1.85
Belle Plaine*	92	36	69.8	1.56	McAlister	102	52	72.0	4.10
Blueville*	104	54	69.1	2.87	McPherson	102	52	72.0	3.00
Carroll*	90†	52†	72.0†	2.07	Minneapolis	110	62	73.9	3.37
Carson*	92	36	72.8	9.95	Monument	100	60	76.6	4.00
Cedar Rapids	93	47	71.2	1.65	Morse*	88	54	68.6	4.00
Clarinda	92	36	72.7	2.35	Ness City	106	64	76.6	1.60
Clinton	94	51	69.8	1.06	Oakley	98	60	76.3	1.80
Cresco	94	42	69.1	0.92	Ogallah	101	65	80.5	3.50
Des Moines	94	45	71.4	1.10	Ottawa	104	60	75.5	5.51
Dysart*	90	55	68.4	1.10	Quinter	101	70	77.6	4.66
Eagle Grove*	94	49	73.8	0.60	Rago*	104	66	86.1	1.75
Elkader*	94	50	69.2	0.20	Richfield	96	58	76.2	5.40
Estherville*	100	55	72.5	0.76	Rome	96	56	76.2	2.50
Fayette†	97	37	69.1	1.20	Salina†	93	61	77.3	2.21
Fort Madison*	93	60	75.6	1.12	Santa Fe†	102	55	78.2	0.90
Gillett†*	92	36	68.4	0.31	Scott City	100	60	76.8	0.80
Glenwood(1)	94	54	74.7	2.77	Sedan*	94	56	73.3	4.12
Glenwood(2)*	92	52	70.0	2.75	Seneca	100	60	76.2	3.14
Grinnell	90	48	71.7	2.39	Sharon Springs	102	48	78.3	2.64
Hampton	94	42	68.4	0.69	Tribunef	102	48	78.3	1.34
Humboldt	93*	41	71.0	2.41	Ulysae	99	54	75.9	0.83
Independence*	87	63	71.0	0.84	Vesper	98	57	76.7	2.21
Iowa City	85	52	69.6	1.46	Victoria	99	60	80.5	3.25
Jefferson*	100	51	73.4	1.50	Wakefield*	100	60	76.7	2.50
Le Claire†	94	48	72.4	3.14	Walker	100	60	76.7	2.50
Logan*†	92	52	73.1	0.55	Wallace	98	57	76.5	3.91
Manson*	94	55	70.5	0.70	Wellington	102	40	72.8	2.70
Maquoketa*	92	58	73.4	1.15	Weskan	97	65	76.5	0.50
McCausland*	100	48	67.6	1.80	Wilson	99	54	75.9	3.81
McGregor*	93	49	69.7	0.22	Winfield	93	53	72.9	.....
Monticello	87	60	72.0	0.77	Winona	99	54	75.9	0.83
Mount Pleasant†	93	55	73.0	2.23	Yates Center	93	53	72.9	.....
Mount Vernon*	93	55	73.0	2.23	<b>Kentucky.</b>				
Muscatine(1)†	91	50	70.0	1.15	Ashland†*	85	53	65.3	1.12
Muscatine(2)	91	50	70.0	1.15	Bernstadt†*	85	54	71.4	2.00
Osage	94	56	73.0	0.56	Bowling Green†	93	57	77.7	2.08
Oskaloosa(1)*	98	48	74.6	0.92	Burnside†p.	89	58	70.7	3.31
Oskaloosa(2)	90	52	69.0	1.30	Canton†*	87	54	71.9	2.62
Sac City*	89	60	71.1	1.52	Catietsburgh†	87	54	71.9	2.62
Storm Lake*	89	60	71.1	1.52	Earlington	87	54	71.9	2.62
Vinton*	91	47	69.5	0.83					
Washington	98	54	78.6	0.78					
Webster City*	96	52	71.0	2.15					
West Bend*	90	54	69.4	4.36					
<b>Kansas.</b>									
Abilene	91	47	69.5	1.70					
	91	47	69.5	1.70					



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Kentucky—Cont'd.</b>	°	°	°	Ins.	<b>Massachusetts—Con.</b>	°	°	°	Ins.
Eddyville	89	59	70.7	0.90	Deerfield (2)*	87	51	66.4	2.05
Falmouth (2)*	89	59	70.7	0.83	Dudley	87	47	66.2	6.10
Frankfort (1)†	89	59	70.7	0.90	Fall River (1)*	80	50	67.1	2.98
Frankfort (2)	89	59	70.7	0.90	Fiskdale	84	50	64.5	2.31
Franklin *	89	59	70.7	2.83	Fitchburg (1)*	84	42	65.1	3.02
Greensburgh	89	59	70.7	1.75	Fitchburg (2)	84	50	65.0	4.26
Louisville	89	59	70.7	0.64	Fort Warren	79	50	65.0	4.49
Mount Sterling†	89	59	70.7	1.01	Framingham	84	45	66.8	4.35
Murray†	100	54	71.0	1.14	Gilbertville	82	44	64.5	6.35
Newport Barracks	98	51	72.2	0.52	Groton	83	43	66.3	2.88
Owenton†	90	53	72.4	0.32	Heath*	92	48	69.3	1.92
Paducah†	90	53	72.4	0.45	Holyoke	88	44	70.1	4.41
Pellville†	94	43	73.2	1.06	Lake Cochituate	87	41	65.7	3.00
Richmond†	94	54	73.8	2.50	Lawrence	88	46	68.0	6.42
Shelbyville†	95	50	74.5	1.05	Leicester	80	48	64.2	3.46
South Fork†	88	59	71.0	0.79	Leominster	80	56	69.6	6.82
Springfield	90	52	71.8	0.30	Long Plain*	82	45	66.4	3.97
Williamsburgh†	90	52	71.8	2.26	Lowell (1)	86	44	66.3	2.98
<b>Louisiana.</b>					Lowell (2)	86	44	66.3	2.98
Abbeville	88	72	77.8	5.31	Lowell (3)	87	47	68.2	2.98
Alexandria†	95	62	80.0	0.75	Ludlow	85	41	63.8	2.98
Amite City†	92	63	77.4	5.88	Lynn	80	49	65.2	5.04
Baton Rouge	95	64	81.7	8.04	Mansfield	82	46	66.2	4.16
Cameron†	101	64	81.7	4.02	Medford	81	44	66.2	5.39
Cheneyville (2)†	96	68	78.9	1.00	Middleborough	81	44	66.2	5.39
Clinton	94	54	74.2	2.34	Milton*	84	50	64.4	3.42
Convent	93	54	74.2	2.34	Monson	82	41	64.4	2.76
Coushatta (1)	96	66	78.8	1.10	Mount Nonotuck	82	41	64.4	2.76
Coushatta (2)†	96	66	78.8	1.10	Mystic Lake	82	41	64.4	2.76
Crowley	90	66	77.1	2.56	Mystic Station	82	41	64.4	2.76
Delhi†	91	64	78.2	3.10	Nahant	79	53	64.6	4.75
Donaldsonville	91	64	78.2	3.10	New Bedford (1)	80	53	66.0	5.60
Edgar†	93	70	81.4	4.05	New Bedford (2)	81	51	67.2	3.58
Emilie	93	66	79.3	4.13	Newburyport (1)	83	49	65.3	2.86
Farmerville	94	61	74.0	0.47	Newburyport (2)	89	50	69.4	2.20
Franklin†	93	62	80.2	2.35	Northampton	85	46	67.2	4.14
Girard†	92	65	78.9	1.18	North Billerica	85	46	67.2	4.14
Grand Coteau	92	65	78.9	1.18	Plymouth*	83	60	68.2	6.54
Hammond	94	64	80.0	8.36	Princeton	83	44	64.0	4.72
Houma†	90	67	78.3	6.22	Provincetown	82	52	67.8	6.86
Jackson	88	69	80.0	4.42	Randolph	84	58	66.4	2.30
Jackson Barracks	93	70	81.9	4.42	Royalston*	83	53	67.6	2.50
Jenette†	91	66	78.6	4.78	Salem (1)*	83	53	67.6	6.19
La Fayette (2)†	92	66	80.0	7.78	Somerset	90	52	70.5	6.19
Lake Charles	97	58	84.0	3.10	South Hingham	83	41	68.6	4.45
Lake Providence	97	62	79.7	2.92	Springfield Army	83	48	68.6	2.39
Liberty Hill	100	59	81.5	0.88	Swampscott	80	53	67.1	5.01
Luling	92	63	78.4	4.98	Taunton (1)	87	51	67.1	7.39
Mandeville	97	66	80.2	5.48	Taunton (2)	84	48	66.9	7.74
Marksville†	95	53	79.5	1.51	Taunton (3)	85	44	66.8	7.34
Manassas	92	65	78.2	3.68	Waltham	84	42	66.0	3.50
Meville†	93	55	78.6	6.17	Wellesley	84	42	66.0	4.37
Minden†	94	63	80.6	0.05	Westborough*	90	48	68.9	3.86
Monroe†	94	62	79.2	0.31	Williamstown	79	46	63.6	2.94
Natchitoches†	98	58	77.6	1.62	Winchester	83	52	65.2	3.51
Plaquemine	96	62	78.7	8.23	Worcester (1)*	83	52	65.2	3.51
Pointe à la Hache†	71*	81.5	6.93		<b>Mexico.</b>				
Port Eads	89	71	82.0	5.53	Guanajuato	82	52	65.8	5.33
Shell Beach	88	67	80.3	3.40	Leon de Aldemas	86	55	70.1	6.42
Sugar Ex. station.	90	66	79.4	4.64	Pueblo	78	51	64.8	
Thibodaux	91	65	79.6	5.35	<b>Michigan.</b>				
Trinity	100	64	81.6	2.44	Adamsville	94	44	68.0	0.88
Vidalia	90	64	79.7	1.87	Adrian	89	50	69.1	0.40
Winfield*	90	64	79.7	1.87	Albion (1)	89	50	69.1	0.40
<b>Maine.</b>					Allegan	92	40	68.0	0.13
Bar Harbor	80	45	64.2	1.17	Alma	88	49	68.1	0.34
Belfast*	80	35	64.5	2.87	Ann Arbor	88	49	68.1	0.16
Calais	84	42	64.6	2.50	Arbela	90	48	64.0	2.83
Cornish	84	50	66.6	1.74	Atlantic	90	48	64.0	1.32
Fairfield	83	42	63.3	3.40	Bail Mountain	89	37	65.5	2.47
Fort Preble	81	40	62.2	1.20	Bear Lake	89	37	65.5	2.47
Kennebec Arsenal	84	48	65.0	2.68	Bell Branch	94	46	69.3	0.88
Lewiston	80	44	61.7	3.35	Berlin	93	50	67.5	1.06
Orono†	83	43	64.3	1.65	Berrien Springs*	90	38	66.4	0.23
Petit Menan*	75	51	59.5	1.16	Big Rapids	92	43	70.1	0.77
Sorrento	84	40	62.8	1.16	Birmingham	89	45	67.2	1.04
West Jonesport*	80	42	58.0		Bronson	89	45	67.2	1.04
<b>Maryland.</b>					Buchanan	85	45	61.6	4.44
Barren Creek Sp'gs†	89	57	76.0	1.32	Calumet	89	49	68.6	0.77
Cumberland (1)	86	50	69.2	1.52	Cassopolis	88	45	66.4	2.06
Fort McHenry	87	53	72.2	1.17	Charlevoix	91	32	65.1	1.01
Frederick	88	55	71.9	1.11	Chase	89	45	67.3	0.30
Gaithersburgh*	80	60	68.1	2.00	Chelsea	89	45	67.3	0.30
Galesburg†	83	48	62.6	2.69	Colon	93	50	73.2	0.32
Gambetta*	83	48	62.6	2.69	Columbia	92	45	68.5	0.80
Jewell*	83	48	62.6	2.69	Concord	92	45	68.5	0.80
McDonogh	84	36	70.6	1.37	Deer Lake	98	34	70.1	0.83
Woodstock	84	36	70.6	1.37	Eden	90	42	68.7	0.36
<b>Massachusetts.</b>					Evart	87	33	63.4	1.84
Amherst	83	42	65.1	3.16	Fitchburg	82	42	67.8	0.14
Amherst ExSta (1)	84	40	64.4	2.69	Flint	92	42	67.8	0.14
Amherst ExSta (2)	82	45	65.6	2.72	Fort Brady	84	39	61.2	2.77
Beverly Farm	79	49	62.9	5.93	Fort Mackinac	77	45	62.5	3.48
Blue Hill (sum't)†	80	50	64.2	3.61	Fort Wayne	92	46	69.3	0.30
Blue Hill (base)	80	46	65.2	3.53	Freemont	93	33	62.2	2.16
Blue Hill (valley)†	83	44	65.6	3.79	Gaylor	88	42	65.8	0.83
Boston	83	52	68.4	4.46	Grand Rapids	90	31	62.4	1.95
Brewster	82	47	66.2	3.27	Grape	92	31	62.4	1.95
Cambridge (1)	85	47	67.6	3.78	Grayling	90	31	62.4	1.95
Cambridge (2)	86	46	67.0	4.51	Gulliver Lake	82	38	62.7	3.60
Chicopee	86	46	67.0	4.51	Hanover	88	47	67.2	0.51
Clinton	82	56	68.4	5.20	Harriaville	88	37	63.1	1.44
Cotuit	82	56	68.4	5.20	Hart	91	50	67.3	0.80
					Hastings	90	42	67.9	0.10
					Hillman	95	37	63.5	2.06

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<b>Michigan—Cont'd.</b>	°	°	°	Ins.	<b>Missouri—Cont'd.</b>	°	°	°	Ins.
Hillsdale	87	48	68.3	0.54	Carthage†	88	54	72.3	2.37
Highland Station	86	50	70.0	1.38	Conception	95	53	71.2	3.94
Hudson	89	39	64.6	0.46	Excelsior Springs*	95	53	71.2	3.94
Ionia	93	42	68.6	0.61	Frankford (1)*	93	53	72.1	1.33
Ivan	94	40	64.7	0.87	Glasgow	94	51	73.0	0.62
Jeddo	93	50	74.1	0.42	Grand Pass	93	53	72.1	1.33
Kalamazoo	90	49	68.7	0.31	Harrisonville*	93	56	71.2	2.48
Lansing	91	45	68.0	0.18	Hermann†	90	60	73.0	0.10
Lathrop	88	33	63.1	3.11	Ironton*	90	60	73.0	0.10
Madison	93	46	65.3	0.60	Jefferson Barracks	100	50	74.0	1.42
Marshall	93	45	68.2	0.61	Jerome†	97	56	75.2	4.41
Mio	88	37	63.5	1.82	Kansas City	102	60	72.2	1.63
Montague	88	44	64.3	0.69	Lamont*	97	56	75.2	4.41
Mottville	91	44	67.3	0.95	Louisiana Bridge†	96	64	75.9	0.93
Noble	93	44	67.6	0.44	New Frankfort*	97	57	75.0	2.80
North Adams	90	42	68.7	0.23	Oak Ridge*	92	52	73.4	2.40
North Marshall	90	40	65.6	0.28	Ozark*	99	57	78.7	0.55
Olivet	91	45	67.2	0.07	Princeton*	92	55	73.0	1.30
Osgo	89	43	65.8	0.07	Saint Charles (1)	90	55	73.0	1.41
Paw Paw	94	43	62.6	0.90	Saint Charles (2)	90	55	73.0	1.41
Pontiac	84	53	68.4	0.53	Saint Joseph†	92	55	73.4	2.19
Pulaski	90	48	68.0	0.41	Savannah*	100	56	77.7	1.24
Rawsonville	90	44	68.1	0.08	Secalia	92	50	73.1	1.68
Roscommon	90	32	63.0	0.58	Shelby	92	50	73.1	1.68
Saint Ignace	84	37	62.3	4.04	Steelville*	92	50	73.1	1.68
Saint John's	92	45	69.1	0.59	Warrensburg*	92	54	73.1	2.07
Sand Beach	88	49	66.4	1.55	Willow Springs†	100g	54	77.1	3.22
Standish	93	39	69.5	1.72	Wither's Mill	92	54	77.1	0.95
Stanton	93	42	68.0	0.51	<b>Montana.</b>				
Stockbridge	93	42	68.0	0.51	Camp Poplar River	102	39	69.8	0.08
Traverse City (1)	94	42	66.8	1.26	Custer†	92	42	67.1	0.00

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Nebraska—Cont'd.</i>					<i>New York—Cont'd</i>				
Hot Springs (2).....	108	50	75.2	0.00	Cooperstown.....	80	50	62.4	0.00
Humboldt (1).....	100	40	72.0	0.00	Daids Island.....	85	53	70.7	4.34
Humboldt (2).....	100	40	68.2	0.00	Eden.....	84	54	69.4	0.04
Lewer's Ranch.....	93	41	72.9	0.00	Factoryville.....	84	41	64.6	1.23
Mill City.....	103	48	71.6	0.00	Fleming.....	95	52	66.1	
Palisade.....	103	50	76.5	0.00	Fort Columbus.....	87	56	72.8	3.28
Pioche.....	98	42	71.4	3.27	Fort Hamilton.....	85	57	71.1	5.62
Punch Bowl.....	89	41	69.2	0.65	Fort Niagara.....	84	52	69.3	1.40
Reno.....	100	50	73.0	0.00	Fort Porter.....	85	52	67.5	0.75
Ruby Hill.....	89	35	65.4	1.55	Fort Schuyler.....	84	54	70.4	4.00
Saint Clair.....	98	43	72.6	0.00	Fort Wadsworth.....	87	54	72.0	5.07
Sodaville.....	103	52	79.3	0.02	Friendship.....	86	40	61.8	2.83
Tecoma.....	102	50	81.3	0.00	Geneva.....	90	47	65.8	2.46
Toano.....	102	62	81.5	0.00	Hess Road Sta.....	85	45	65.5	1.81
Tuscarora.....	94	36	66.2	0.16	Honeycomb Brook.....	87	44	64.8	3.09
Verdi.....	98	48	71.0	0.00	Humphrey.....	87	48	65.6	1.63
Wadsworth.....	102	56	80.8	0.00	Ilion.....	85	43	64.4	2.07
Wells.....	102	60	80.4	0.00	Ithaca.....	86	48	65.5	3.32
Winnemucca.....	97	43	72.4	0.00	Kingston.....	95	40	69.8	2.83
Yount's Ranch.....	100	58	83.8	0.10	Lyons.....	86	50	65.7	1.53
<i>New Hampshire.</i>					Madison Barracks.....				
Antrim.....				3.10	Middleburgh.....	88	44	65.1	2.85
Belmont.....				1.28	Nineveh.....	90	50	66.4	3.60
Berlin Falls.....	87	35	59.6		North Hammond.....	88	55	66.8	1.78
Berlin Mills.....	86	49	65.7	1.00	Number Four.....	80	38	60.1	3.80
Bristol.....				1.99	Palermo.....	84	41	63.6	1.20
Concord.....	82	46	64.7	1.57	Palmyra.....	87	53	67.3	
Hanover (1).....	81	44	63.8	1.78	Pendleton Centre.....	85	57	64.7	
Hanover (2).....	88	41	62.9	2.05	Perry City.....	85	47	61.5	3.04
Lake Village.....				1.74	Plattsburgh B'ks.....	86	45	66.0	1.43
Manchester (1).....	84	44	66.1	1.77	Queensbury.....	87	51	63.8	2.55
Manchester (2).....	84	45	66.7	1.83	Rome.....	83	45	64.8	1.67
Nashua.....	86	44	65.7	2.36	Saranac Lake.....	83	41	60.8	2.72
Newton.....	84	40	65.0	2.32	Savona.....	86	40	63.5	2.76
North Chesterfield.....	84	38	56.9	1.55	Setauket.....	83	58	68.8	4.16
North Conway.....	84	41	63.3	3.02	Somerset.....	83	58	66.3	
North Sutton.....	86	45	62.6	1.88	South Canisteo.....	84	46	61.9	3.12
Plymouth.....	86	40	64.2	3.17	South Kortright.....	80	44	60.6	3.26
Shaker Village.....	81	43	62.9	1.38	Tannersville.....	80	36	60.8	4.29
Stratford.....	91	42	66.4	1.81	Turin.....	88	53	64.2	1.25
Walpole.....	82	47	63.0	1.97	Utica.....	88	42	65.2	2.48
West Milan.....	82	36	60.4	1.54	Watervliet Arsenal.....	86	49	66.7	5.35
Weir's Bridge.....				1.71	Wedgewood.....	86	51	66.4	4.73
Wolfborough.....				1.13	West Point.....	88	46	68.8	4.09
<i>New Jersey.</i>					White Plains.....				
Allaire.....	90	50	68.8		Willett's Point.....	84	53	70.0	4.02
Asbury Park.....	90	52	70.8	6.04	<i>North Carolina.</i>				
Beverly.....	91	52	69.6	5.76	Asheville (1).....				5.46
Billingsport L. H.....	90	58	73.2		Asheville (2).....	83	50	68.8	5.46
Bridgeton.....	89	63	74.1	3.29	Belwood.....	80	64	72.5	4.01
Cape May C. H.....	87	56	70.7		Charleston.....	80	64	72.5	4.01
Egg Harbor City.....	88	50	69.6	5.23	Goldsbrough.....	90	53	76.5	3.73
Freehold.....	86	52	69.8	7.98	Grover.....	84	60	74.7	0.77
Gillette.....	88	49	69.4	4.60	Highlands.....	82	46	66.8	5.59
Hanover.....	85	46	66.4	4.23	Lenoir.....	82	56	70.4	4.20
Highland Park.....	87	52	69.8	4.88	Lumberton.....	70	58	75.6	7.61
Hopewell.....				5.26	Mount Holly.....	80	58	75.6	2.80
Imlaytown.....	89	52	70.7	7.30	Murphy.....	90	58	74.6	6.09
Jersey City.....	86	54	72.1		New Bern.....	91	60	75.0	2.89
Lambertville.....	86	54	70.1	3.98	Raleigh.....	91	60	75.0	6.23
Locktown.....	86	50	70.2	5.77	Soapstone Mount.....	88	58	71.6	6.45
Madison.....	90	50	70.3	4.10	Wadesborough.....	88	60	73.8	9.75
Moorestown.....	85	54	69.9	5.50	Weldon (1).....	90	59	73.5	3.34
Newark.....	87	55	70.7	4.57	Weldon (2).....	90	55	74.2	3.49
New Brunswick (1).....	85	55	70.7	5.01	<i>Ohio.</i>				
New Brunswick (2).....	86	54	70.1	5.16	Akron.....	88	48	67.4	1.83
New Brunswick (3).....	86	52	69.7		Ashland.....	88	48	67.4	2.33
Ocean City.....	89	65	73.4	4.00	Athens.....	91	48	68.9	1.20
Oceanic.....	95	58	74.1	9.06	Bangorville.....	88	50	67.2	2.37
Plainfield.....	91	51	69.8	5.85	Beaumont.....	90	52	71.7	2.30
Rancocas.....	86	36	61.7	6.18	Bellville.....	89	53	66.8	3.43
Readington.....	88	62	71.7		Bement.....	88	55	61.6	1.41
South Orange.....	86	51	68.1	4.69	Caledonia.....				1.40
Tenafly.....	88	45	68.4	4.98	Canton.....	88	46	67.3	3.02
Tom's River.....	88	42	70.4	9.42	Carrollton.....	88	54	67.4	3.30
Trenton.....	90	58	76.0	7.23	Celina.....	89	50	69.9	1.30
Union.....	86	35	69.0	4.02	Circleville (1).....				0.59
Valley.....				3.21	Circleville (2).....				0.90
Woodbury.....	90	56	72.3	5.09	Clarksville.....	92	49	69.8	1.11
<i>New Mexico.</i>					Cleveland.....	88	51	67.2	1.33
Albuquerque.....	96	57	76.6	0.21	College Hill.....	95	62	75.4	0.50
Coolidge.....	97	46	74.0		Columbus Barracks.....	96	47	70.7	2.13
Deming.....	109	74	87.1	0.64	Dayton.....	92	46	71.7	0.34
Eddy.....				0.91	Demos.....	84	47	64.8	1.21
Fort Bayard.....	95	51	72.7	0.70	Ellsworth.....				1.99
Fort Marcy.....	91	52	71.4	1.48	Elyria.....	88	48	68.2	2.95
Fort Selden.....	108	56	81.9	0.26	Fostoria.....	94	49	71.2	0.87
Fort Stanton.....	91	46	69.1	0.81	Gallipolis.....	89	40	63.0	0.73
Fort Union.....	81	43	66.6	2.30	Garrettsville.....	89	40	63.0	3.88
Fort Wingate.....	85	50	68.79	0.75	Georgetown.....	100	54	72.0	1.51
Gallinas Spring.....	93	60	77.4	1.77	Granville.....	92	50	69.3	0.73
Hillsborough.....	95	55	75.6	0.76	Gratiot.....	87	50	67.2	1.22
Las Vegas.....	97	58	67.1	1.15	Greenville.....	88	50	67.2	0.55
Los Lunas.....	104	50	78.7	0.37	Hanging Rock.....	92	52	68.7	2.22
Red Cañon.....				0.65	Hiram.....	90	50	66.0	2.22
Springer.....				0.50	Hudson.....				2.52
<i>New York.</i>					Jacksonborough.....	92	58	73.0	0.60
Alfred Centre.....	80	42	62.2	1.85	Jefferson.....	88	47	64.6	0.94
Angelica.....	81	38	61.5	2.60	Kent.....	88	47	68.2	2.61
Arcade.....	84	40	62.2	2.18	Kenton.....	88	51	67.3	1.45
Ardenia.....	85	57	68.2	2.46	Leipais.....	92	55	71.0	0.85
Auburn.....	83	49	65.0	2.96	Logan.....	94	46	66.0	1.70
Boyd's Corners.....	90	55	69.3	2.90	Lordstown.....	88	38	66.1	0.80
Canton.....	79	47	63.5	2.08	Mansfield.....	92	58	73.0	3.05
Constableville.....	84	47	61.2	1.65	Marietta (1).....	87	45	67.7	3.47

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Ohio—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>Pennsylvania—Con.</i>	°	°	°	<i>Ins.</i>
Marietta (2).....	90	50	69.9	1.81	Reading.....	87	46	69.2	3.33
McConnelville.....	94	46	69.9	0.91	Rimersburgh.....	86	52	67.7	.....
Napoleon.....	92	48	71.3	1.47	Salem Corners.....	80	46	63.0	3.31
New Alexandria.....	88	48	69.0	1.13	Saltsburgh.....	.....	.....	.....	2.79
New Athens.....	92	45	65.4	2.00	Seisholtzville.....	.....	.....	.....	4.15
New Comerstown.....	89	45	67.1	1.09	Selin's Grove.....	87	52	71.8	6.00
North Lewisburgh.....	93	49	70.8	1.55	Smith's Corners.....	.....	.....	.....	4.88
Oberlin.....	84	48	67.9	1.73	Somerset.....	83	41	62.7	3.35
O. S. University.....	93	40	68.8	2.07	State College.....	85	44	65.9	3.15
Orangeville.....	92	42	63.4	1.80	Swarthmore.....	87	54	70.1	3.58
Ottawa.....	.....	.....	.....	1.06	Tionesta.....	100	45	62.6	2.40
Poland.....	90	46	60.5	2.25	Troy.....	88	42	64.6	0.89
Pomeroy.....	90	48	74.7	0.66	Tuscarora.....	91	57	70.8	3.47
Portsmouth (1).....	.....	.....	.....	0.91	Uniontown.....	87	46	69.1	3.86
Portsmouth (2).....	90	54	69.8	0.92	Warren.....	.....	.....	.....	3.41
Shanesville.....	90	55	70.4	.....	Wellsville.....	86	38	62.3	0.83
Shiloh.....	87	46	65.0	2.45	West Chester.....	86	53	70.5	4.43
Sidney.....	88	50	71.1	3.74	Wyosox.....	86	39	64.4	2.07
Springborough.....	.....	.....	.....	0.81	York.....	88	46	70.2	2.83
Tiffin.....	88	57	70.3	0.71	<i>Rhode Island.</i>	.....	.....	.....	.....
Upper Sandusky.....	88	48	69.1	2.09	Bristol.....	80	52	67.8	5.40
Vienna.....	89	50	65.5	2.55	Fort Adams.....	87	50	68.4	4.41
Wapakoneta.....	94	48	71.3	0.40	Kingston (1).....	82	49	66.1	4.57
Wauseon.....	94	45	68.0	2.22	Kingston (2).....	83	50	66.7	5.59
Waverly.....	93	54	72.6	1.54	Lonsdale.....	.....	.....	.....	4.51
Waynesville.....	.....	.....	.....	0.84	Newport.....	80	54	68.2	.....
Westerville.....	88	45	66.4	1.38	Olneyville.....	86	51	70.1	.....
West Milton.....	95	52	72.9	1.40	Pawtucket.....	.....	.....	.....	5.57
Weymouth.....	.....	.....	.....	1.64	Providence (1).....	84	50	68.2	5.83
Wooster.....	90	45	66.0	1.98	Woonsocket.....	84	50	67.1	4.38
Yellow Springs.....	89	47	69.1	0.57	<i>South Carolina.</i>	.....	.....	.....	.....
Youngstown.....	88	46	67.9	1.35	Allendale.....	92	64	78.0	2.65
Zanesville.....	.....	.....	.....	1.14	Batesburgh.....	92	54	74.2	6.33
<i>Oregon.</i>	.....	.....	.....	.....	Belmont.....	86	62	74.0	5.30
Albany.....	88	43	63.2	1.08	Blackville.....	92	60	77.1	5.66
Ashland.....	89	46	68.3	0.10	Branchville.....	92	62	77.2	4.23
Bandon.....	70	48	56.9	0.73	Brewer Mine.....	92	45	68.5	8.17
East Portland.....	84	52	.....	0.90	Cedar Springs.....	90	55	72.5	5.10
Eola.....	85	47	63.9	1.39	Cheraw.....	94	58	76.5	10.01
Grant's Pass.....	90	38	67.2	0.09	Chester.....	97	60	76.4	4.32
Heppner.....	94	39	66.7	0.10	Clinton.....	86	64	75.0	8.73
La Grande.....	92	38	67.4	0.04	Conway.....	88	61	74.5	4.45
Mount Angel.....	85	42	65.0	1.34	Evergreen.....	85	60	72.5	6.11
Parkers.....	.....	.....	.....	0.02	Florence.....	92	60	77.7	11.86
Siskiyou.....	92	48	67.8	0.00	Greenville.....	88	56	74.2	6.30
Tillamook.....	71	46	58.4	2.30	Greenwood.....	90	60	74.9	5.10
<i>Pennsylvania.</i>	.....	.....	.....	.....	Hardeeville.....	94	64	78.0	6.41
Allegheny Arsenal.....	93	47	70.2	1.90	Jacksonborough.....	92	58	76.7	9.83
Altoona.....	88	52	70.5	1.52	Kingstree.....	92	56	74.7	6.16
Aqueduct.....	88	55	69.1	3.10	Kirkwood.....	61	71.5	7.54	.....
Bethlehem.....	86	46	71.1	4.10	Port Royal.....	89	68	78.0	4.63
Blooming Grove.....	87	52	65.6	4.70	Saint Georges.....	92	58	76.4	4.66
Blue Knob.....	86	44	62.6	2.20	Saint Matthews.....	90	62	76.2	3.37
Brookville.....	.....	.....	.....	2.82	Spartanburgh (2).....	90	56	73.5	6.11
Cannonsburgh.....	84	45	67.9	1.64	Statesburgh.....	86	61	73.5	7.05
Carlisle.....	95	52	72.9	2.49	Timmonsville.....	86	68	77.0	5.68
Catawissa.....	84	49	67.0	6.17	Trial.....	87	65	76.0	8.73
Charlestown.....	87	42	64.9	1.06	Winnabow.....	96	55	75.5	8.66
Clarion (1).....	.....	.....	.....	2.85	Yorkville.....	89	58	73.5	1.73
Coatesville.....	89	46	68.9	3.05	<i>Tennessee.</i>	.....	.....	.....	.....
Confluence.....	.....	.....	.....	3.38	Andersonville.....	85	51	71.0	4.91
Corry.....	92	37	64.0	2.37	Arlington.....	94	58	74.3	2.18
Coudersport.....	85	38	65.6	3.80	Ashwood.....	88	63	73.8	6.70
Drifton.....	84	44	64.1	4.77	Austin.....	88	58	75.8	3.01
Doylesburg.....	.....	.....	.....	4.28	Bolivar (1).....	96	66	82.3	2.55
Dyberry.....	84	36	61.2	2.85	Bolivar (2).....	94	56	76.4	0.40
Eagle's Mere.....	79	48	64.8	2.82	Brownsville.....	94	62	79.6	1.99
Easton.....	.....	.....	.....	5.27	Carthage.....	.....	.....	.....	0.08
Edinburgh.....	83	44	66.0	.....	Charleston.....	.....	.....	.....	3.69
Emporium.....	86	41	69.2	3.23	Clarksville.....	91	55	75.2	1.20
Forks of Neshaminy.....	84	59	70.1	5.30	Clinton.....	.....	.....	.....	7.35
Franklin.....	82	44	61.4	2.12	Cog Hill.....	86	68	76.7	3.50
Frankford Arsenal.....	89	52	71.3	5.00	Columbia.....	.....	.....	.....	4.06
Frederick.....	.....	.....	.....	3.83	Covington (1).....	88	65	75.0	2.25
Freeport.....	.....	.....	.....	3.19	Covington (2).....	96	50	76.2	2.40
Germanstown.....	85	58	70.6	6.60	Dunlap.....	89	60	74.3	2.32
Gettysburgh.....	.....	.....	.....	3.51	Dyersburgh.....	97	54	76.6	1.62
Girardville.....	95	48	67.9	6.03	Fayetteville.....	90	62	74.8	3.53
Grampian Hills.....	86	40	65.8	4.00	Florence Station.....	86	61	73.8	2.83
Greensborough.....	.....	.....	.....	3.95	Postoria.....	87	52	68.2	3.70
Greenville.....	84	39	63.6	1.83	Grand Junction.....	92	64	77.1	1.22
Holidaysburgh.....	90	41	66.7	1.37	Greeneville.....	81	55	69.1	2.66
Honesdale.....	80	39	62.0	2.60	Grief.....	90	60	72.5	3.01
Huntingdon.....	90	43	67.6	1.80	Hohenwald.....	94	54	71.0	5.05
Johnstown.....	86	46	65.9	3.95	Jacksborough.....	84	55	71.6	4.03
Lansdale.....	.....	.....	.....	4.66	Johnsonville.....	.....	.....	.....	3.03
Le Roy.....	83	48	66.4	2.08	Kingston (1).....	.....	.....	.....	3.15
Lock No. 1.....	.....	.....	.....	2.18	Kingston Springs.....	88	55	72.3	1.57
Mahoning.....	.....	.....	.....	1.18	Leeville.....	91	59	75.8	1.39
Meadville (1).....	84	.....	.....	1.64	Lewisburgh.....	90	62	73.9	5.86
Meshoppen.....	82	40	64.7	0.48	Lookout Mountain.....	88	55	71.7	4.31
Myersdale.....	89	47	68.7	3.07	Loudon.....	.....	.....	.....	1.71
New Bloomfield.....	90	40	67.2	2.75	Lynville.....	88	58	72.2	2.22
New Castle.....	91	42	69.9	2.28	McKenzie.....	88	62	76.0	0.35
Nisbet.....	84	54	65.8	2.80	McMinville.....	86	64	71.5	3.74
Oil City.....	.....	.....	.....	1.65	Milan (1).....	92	57	74.5	1.43
Ostriville.....	.....	.....	.....	5.13	Milan (2).....	94	54	76.0	1.29
Parker's Landing.....	.....	.....	.....	3.06	Nunnely.....	87	56	72.8	3.91
Petersburgh.....	96	42	68.6	3.12	Parksville.....	87	56	73.0	2.33
Philadelphia.....	.....	.....	.....	6.04	Riddleton.....	86	57	72.8	2.60
Philipsburgh.....	88	38	66.6	2.40	Rockwood.....	.....	.....	.....	1.85
Pleasant Mount.....	.....	55	65.0	3.90	Rogersville.....	86	60	71.7	3.72
Point Pleasant.....	.....	.....	.....	3.75	Rugby.....	86	59	70.5	5.12
Pottstown.....	88	50	72.0	5.05	Savannah.....	93	62	75.7	4.64
Quakertown.....	87	45	67.7	4.70	Springdale.....	90	58	72.1	3.32



## Meteorological record of voluntary observers, &amp;c.—Continued.

## Reports received too late for publication in July—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Tennessee—Cont'd.</i>	o	o	o	<i>Ins.</i>	<i>Vermont.</i>	o	o	o	<i>Ins.</i>
Strawberry Plains†	89	55	73.1	5.60	Brattleborough (1)	85	46	66.7	4.04
Trenton	89	55	73.1	5.60	Brattleborough (2)	81	47	64.2	2.48
Tullahoma	84	62	73.6	2.60	Burlington	83	48	70.9	1.85
Watkins	95	64	78.0	0.98	Chelsea*	76	48	59.9	1.41
Waynesborough	85	59	72.2	4.68	Cornwall	86	39	64.0	3.29
Woodstock	95	69	78.2	2.70	East Berkshire†	88	39	61.4	4.04
<i>Texas.</i>					Jacksonville	88	39	61.4	4.04
Austin (1)	99	70	83.6	0.47	Lunenburg*	94	48	67.8	1.74
Austin (2)*	100	68	82.4	0.00	Manchester*	86	50	64.5	4.31
Baird†	98	69	78.2	0.00	Saint Johnsbury*	80	43	60.6	1.48
Belton†	100	62	82.4	0.92	Stratford*	82	46	65.9	2.00
Brady†	97	62	80.8	0.02	Vernon	82	52	65.4	2.16
Brasoria†	90	68	78.5	5.78	<i>Virginia.</i>				
Brenham†	98	65	84.8	1.34	Abingdon†	89	62	74.4	4.05
Brownwood†	100*	63	82.9	0.21	Bird's Nest*	81	46	63.4	0.80
Camp Eagle Pass	102	67	84.4	2.85	Christiansburg†	83	49	68.8	3.55
Cp Peña Colorado	101	55	76.2	1.24	Dale Enterprise†	85	34	72.7	2.80
Cleburne	97	59	79.0	0.25	Fort Monroe	90	63	75.3	7.16
Coldwater	102	63	82.4	1.19	Fort Myer	90	53	72.1	4.28
College Station	102	63	82.4	1.19	Lexington†	87	48	70.2	4.88
Colorado†	104	63	81.3	3.28	Middletown†	91	52	70.4	4.88
Columbia Station†	96	68	84.2	3.28	Mossingford†	85	58	69.9	4.18
Coriscana (1)†	100	62	79.6	0.65	Petersburg†	89	58	73.0	2.38
Coriscana (2)†	100	62	79.6	0.65	Smithfield*	86	57	72.2	6.16
Dallas (1)	97	61	79.5	4.17	Spottsville*	92	55	72.8	6.00
Dallas (2)†	98	64	82.4	3.00	Summit	86	50	69.7	3.16
Decatur†	98	62	78.4	0.75	Wytheville	86	50	69.7	5.59
Duval*	102	70	85.5	5.25	<i>Washington Territory</i>				
Edinburgh†	105	70	85.5	4.88	Blakeley†	87	44	63.0	1.82
Fort Bliss	105	62	83.1	0.00	Fort Canby	80	47	59.0	3.48
Fort Brown	95	70	81.3	8.45	Fort Spokane	94	39	68.1	0.25
Fort Clark	100	65	81.4	1.00	Fort Townsend	72	42	59.2	1.34
Fort Davis	96	60	77.2	1.80	Fort Walla Walla	97	45	61.6	0.05
Fort Elliott	100	58	78.6	1.00	Vancouver B'ks	85	41	64.6	1.12
Fort Hancock	110	52	78.9	1.08	Vashon	82	48	62.3	1.79
Fort Ringgold	109	65	84.8	3.00	<i>West Indies.</i>				
Fort Worth†	95	63	81.9	0.72	Hamilton, Bermuda	85	72	79.4	4.12
Fredericksburg*	97	63	77.5	0.73	Havana	94	71	80.8	7.74
Gallinas†	100	62	81.3	1.86	<i>West Virginia.</i>				
Graham†	101	55	82.0	0.82	Buckhannon†	87	46	66.2	2.33
Granbury†	98	72	82.3	0.10	Charleston†	81	46	66.2	1.50
Hartley†	105	31	86.2	0.93	Clarksburg	80	55	68.6	1.89
Hearne†	96	62	79.5	1.50	Ella†	80	55	68.6	1.89
Houston†	96	66	81.2	1.53	Glenville†	92	47	65.8	1.61
Howe†	96	63	77.6	2.63	Harper's Ferry†	92	44	64.7	0.20
Huntsville†	98	63	81.9	1.96	Hinton†	92	52	68.5	1.67
La Grange†	91	60	76.2	5.49	Kingwood†	92	47	65.8	1.61
Lampasas	97	66	81.5	0.29	Morgantown†	92	47	65.8	1.61
Longview†	98	66	80.0	0.62	Pleasant Hill†	92	44	64.7	0.20
Luling†	98	66	82.6	0.97	Point Pleasant†	92	52	68.5	1.67
Menardville*	96	63	78.4	0.18	Rivesville†	92	52	68.5	1.67
Merkel†	100	61	80.9	2.21	Rowlesburg (1)†	88	48	69.0	0.90
Mesquite†	100	61	80.9	2.21	Rowlesburg (2)*	88	48	69.0	0.90
Miami†	93	75	81.6	2.09	Seven Pines*	75	50	74.2	1.14
Navasota†	100*	67	82.3	6.00	Tannery†	78	50	74.2	1.14
New Braunfels†	96	67	81.1	3.33	Tyler Creek*	75	50	74.2	1.14
New Ulm	96	67	81.1	3.33	Weston†	75	50	74.2	1.14
Orange†	92	76	83.2	6.05	<i>Wisconsin.</i>				
Panhandle	101	65*	76.6	1.32	Cadiz†	50	66.4	2.92	2.92
Paris†	98	64	81.0	2.00	Chippewa Falls†	88	55	68.6	3.00
Pecos City†	104	63	76.6	0.01	Embarras*	91	44	67.0	1.60
San Antonio	106	56	82.8	3.02	Fond du Lac	91	44	67.0	1.60
Santa Maria†	102	57	79.1	4.50	Friendship†	91	48	67.4	3.31
Silver Falls†	102	57	79.1	4.50	Glasgow†	79	57	67.7	6.49
Snyder†	98	70	76.2	0.00	Grantsburg†	86	38	66.8	4.83
Tyler†	98	60	78.5	0.10	Greenwood†	86	32	64.6	4.83
Waco†	100	64	83.3	0.00	Haywood†	102	54	69.7	5.02
Weatherford†	100	58	78.6	0.01	Honey Creek g	93	52	73.6	1.85
<i>Utah.</i>					Lincoln*	90	51	70.0	0.72
Alta				1.25	Madison	90	45	67.6	2.46
Bingham				0.00	Manitowoc	90	45	67.6	2.46
Beaver†	92	44	69.5	1.93	Medford†	90	45	67.6	2.46
Blue Creek*	104	53	83.1	0.60	Neillsville*	98	52	67.4	3.90
Corinne*	103	52	81.3	0.45	Phillips†	98	52	67.4	3.90
Fort Douglas	98	46	77.9	0.87	Portage†	98	52	67.4	3.90
Fort Duchesne	101	39	71.6	0.00	Richland Centre†	96	56	68.0	0.49
Kelton*	106	60	81.2	0.00	Summit Lake†	94	42	63.7	3.60
Levan				1.18	Viroqua*	90	50	69.8	2.35
Loose†	98	56*	70.0	2.42	Wausau†	89	38	65.6	3.40
Moab				0.45	Wausau* n	102	56	81.2	7.55
Mount Carmel†	87	52	69.5	1.86	Weston*	52	66.4	7.55	7.55
Mount Pleasant†	75	38	59.1	0.55	<i>Wyoming.</i>				
Nephi†	100	42	76.8	1.96	Borodaux				0.65
Opden (1)*	100	50	80.4	1.62	Carters				1.10
Opden (2)*	96	58	77.6	1.03	Camp Pilot Butte	97	42	71.3	0.29
Opden (3)*				1.50	Camp Sheridan	91	36	64.0	0.64
Park City				0.00	Fort Bridger	93	29	65.4	1.37
Priest				0.00	Fort D. A. Russell	98	34	68.0	1.69
Provo				0.00	Fort Laramie	102	38	70.8	0.90
Richfield†	96	42	70.2	1.75	Fort Washakie	93	38	67.3	0.46
Saint George†	111	63	85.7	0.00	Lusk†	94	38	68.0	0.16
Stockton				0.00	Sweetwater B'dge†				0.47
Terrace*	102	60	81.0	0.00	Wheatland	85			0.75

## Reports received too late for publication in July.

Stations.	Max.	Min.	Mean	Precip'n.	Stations.	Max.	Min.	Mean	Precip'n.
<i>Alaska.</i>	o	o	o	<i>Ins.</i>	<i>Arizona—Cont'd.</i>	o	o	o	<i>Ins.</i>
Killisnoo	72	45	58.5	1.85	Chloride				0.14
Arizona					Cottonwood				3.70
American Flag				0.44	Crittenden				2.17
Calabasas				3.46	Dudleyville				2.46

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Arizona—Cont'd.</i>	o	o	o	<i>Ins.</i>	<i>Kentucky.</i>	o	o	o	<i>Ins.</i>
Duncan				1.40	Frankfort (1)				8.20
Gillette				1.62	<i>Mexico.</i>				
Maple Canyon (no'r)				5.44	La Logia*	103	79	86.7	5.86
Mayer				4.14	Puebla	84	52	66.6	27.13
Mesa City				0.41	Topolobampo*	90	79	85.7	7.17
Mineral Park				0.14	<i>Minnesota.</i>				
Payson				2.40	Crookstown*	95	51	70.7	.....
Red Rock				2.54	<i>Mississippi.</i>				
Saint John's				3.60	Jackson (2)	98	66	82.0	1.43
Silver King				1.88	<i>Missouri.</i>				
Stanton				1.26	Fayette	99	52	75.0	4.81
Texas Hill	121	85	99.2	T.	Harrisonville*	97	58	75.0	6.29
Tip Top (2)				2.46	Savannah				6.30
Tres Alamos				2.84	<i>Nebraska.</i>				
Williams	96	45	67.5	1.45	Sargent	101		75.0	4.76
<i>Arkansas.</i>					<i>Nevada.</i>				
Dardanelle				9.04	Browns	110	65	85.2	0.00
<i>California.</i>					<i>New Hampshire.</i>				
Alcade	114	65	86.7	0.00	Antrim				6.80
Boca	103	40	63.9	0.00	<i>New York.</i>				
Boulder Creek	96	45	69.4	0.00	Friendship*	88	50	67.4	4.30
Colegrove				0.00	Saranac Lake	83	45	65.5	4.25
Dunsmuir	110	48	70.8	0.00	<i>North Carolina.</i>				
El Verano	100	52	65.7	0.00	Highlands	77	44	62	4.33
Porterville	116	68	89.0	0.00	<i>Ohio.</i>				
Salton	119	78	95.3	0.00	Marietta (3)				7.86
Selma	110	67	85.7	0.00	<i>Oregon.</i>				
Shingle Springs	104	59	79.5	0.00	Cascade Locks	89			0.00
Stockton	98	55	72.3	0.00	Corvallis	92	49	72.0	0.56
Vina	114	59	81.8	0.00	Creswell	97	58	70.8	0.00
<i>Colorado.</i>					Ellensburg				0.16
Como (near)	82	37	57.6	2.41	Gardiner				1.95
T. S. Ranch	99	55	77.6	T.	Heppner				0.12
<i>Connecticut.</i>					Jacksonville	99	46	75.4	0.00
Hartford (1)	89	52	71.3	10.79	Lone Rock	98			0.53
<i>Georgia.</i>					The Dalles	98	48	74.3	T.
Andersonville	108	66	85.2	8.05	<i>Pennsylvania.</i>				
Fort Gaines	103	71	84.4	8.11	Coudersport	89	39	67.2	7.00
<i>Illinois.</i>					Huntingdon	90	48	70.3	5.58
Kankakee	90	60	71.45	.....	Seisholtzville				11.76
Oneida*	96	61	75.2	2.00	<i>South America.</i>				
Seneca	95	57	71.04	.....	<i>Dutch Guiana.</i>				
<i>Indiana.</i>					Burnside-Coronie..	90	72	79.0	10.56
Earl Park	93	60	71.88	.....	<i>Texas.</i>				
La Fayette (2)	93	60	72.58	.....	Fort Worth	95 <sup>m</sup>	67	79.8	14.01
Lawrenceburgh	95	58	73.35	.....	Gainesville*	96 <sup>c</sup>	66 <sup>c</sup>	78.8	6.41
Lebanon	89	59	70.67	.....	Roby	96 <sup>f</sup>	59 <sup>f</sup>	76.2 <sup>f</sup>	.....
Sunman (2)	91	61	73.43	.....	<i>West Indies.</i>				
<i>Iowa.</i>					Hayti.				
Denmark				6.39	Port au Prince	96	68	81.5	1.27
Eagle Grove*	94	53	75.2	4.30	<i>West Virginia.</i>				
Osage				1.92	Buckhannon				8.31
Wesley	94	44	69.6	3.35	Charleston				6.32
<i>Kansas.</i>					Gladesville*	83	60	69.6	.....
Concordia (near)	92	50	77.0	8.90	Glenville				9.61
Emporia	97	58	76.6	3.89	Wheeling				2.05
					<i>Wisconsin.</i>				
					Waucousta k	74*	45	64.4	.....

*Precipitation (inches and hundredths) observed at Fort Riley, Kans., by assistant surgeons, U. S. Army.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1853		0.94	1.86	4.55	4.35	1.10	0.00	1.65	1.85	0.02	2.71	0.55	16.93
1854	0.00	0.25	0.51	0.63	3.93	5.06	2.15	4.30	6.52	0.00	1.80	0.40	26.25
1855	0.61	0.84	0.68	1.48	1.94	4.55	3.40	4.90	1.10	1.96	1.96	1.93	24.84
1856	0.07	3.57	0.35	0.81	0.91	1.20	0.20	4.37	3.09	1.29	1.39	2.20	17.96
1857	0.63	0.57	0.92	3.75	3.29	5.30	4.66	4.10	1.66	4.41	0.74	0.75	33.97
1858	1.24	0.05	1.27	0.97	5.70	1.95	4.55	5.84	1.17	1.59	0.77	0.00	23.47
1859	2.79	0.16	1.27	0.35	1.16	3.04	1.17	1.82	2.21	0.23	2.47	0.26	15.36
1860	0.70	2.17	0.00	0.13	4.94	6.75	4.85	1.50	6.30	1.42	0.49	0.55	31.63
1861	1.38	1.00	0.66	1.21	4.94	6.75	4.85	1.50	6.30	1.42	0.49	0.55	31.63
1862	0.57	0.65	0.68	1.73	2.52	1.78	2.92	1.89	2.55	1.75	1.35	1.62	20.01
1863	0.48	0.00	0.00	2.03	3.35	4.96	6.62	5.71	0.83	0.67	1.21	0.52	28.38
1864	0.20	1.07	0.89	0.95	1.58	2.28	2.44	2.15	0.16	1.40	0.00	0.00	
1865	0.00	1.53	1.13	2.85	1.10	5.47	2.80	2.18	1.00	2.92	0.00	0.47	21.17
1866	1.70	0.00	0.00	0.77	3.64	8.09	5.84	7.13	0.34	0.94	2.38		
1867	0.36	1.78	0.33	2.86	4.39	8.09	5.84	7.13	0.34	0.94	2.38		
1868	0.06	0.60	1.40	1.30	0.79	2.68	1.49	8.63	2.18	2.28	1.79	1.13	24.33
1869	0.41	2.29	0.41	2.06	1.56	5.48	6.83	3.10	3.46	4.43	1.83	2.97	31.83
1870	0.08	0.00	0.76	0.44	1.68	1.11	1.74	5.24	5.45	5.17	0.07	1.86	23.99
1871	1.76	2.06	0.99	3.02	4.93	1.19	7.38	4.11	0.79	0.93	4.71	0.32	32.19
1872	0.02	0.69	1.41	1.36	4.06	2.08	7.19	4.83	6.74	2.53	0.00	0.64	31.55
1873	1.26	0.48	0.43	1.40	4.79	7.17	2.71	0.90	1.91	0.66	0.51	0.44	22.05
1874	0.44	0.54	0.31	1.01	2.30	4.22	3.00	4.43	4.18	0.01	1.20	0.20	15.14
1875	0.00	0.20	0.61	1.22	1.76	2.45	3.19	1.22	3.10	0.52	1.10	2.92	15.49
1876	0.06	0.19	2.64	4.51	3.28	4.10	5.30	12.86	0.96	1.96	1.56	0.03	37.39
1877	T.	0.72	2.16	2.45	4.79	5.14	4.90	3.46	1.14	5.22	1.10	1.54	32.68
1878		1.21	1.38	1.72	4.49	5.11	8.25	2.31	2.30	0.00	0.12	0.25	
1879	0.00	0.25	0.00	0.25	2.00	9.65	3.05	0.40	3.36	1.17	8.37	0.56	33.06
1880	0.32	0.00	0.51	0.58	3.45	2.89	2.39	10.20	4.95	2.99	1.86	0.10	30.24
1881	0.47	0.25	0.23	1.01	5.07	4.99	2.41	0.76	5.27	4.19	1.42	0.20	28.87
1882	0.13	0.45	0.10	3.49	3.20	2.72	7.86	0.16	0.42	2.23	0.60	0.08	21.44
1883	0.00	0.78	0.54	1.34	3.92	7.16	3.61	1.30	0.74	0.08	0.00	0.00	22.02
1884	0.00	1.51	2.14	2.00	2.96	2.62	5.47	3.40	1.76	0.50	0.50	0.20	
1885	0.24	0.42	0.06	4.20	6.48	1.18	5.55	0.86	3.90	0.86	0.14	0.00	
1886	0.58	0.30	1.05	2.68	3.10	2.98	2.40	1.38	0.32	1.74	0.80	0.62	18.01
1887	0.14	0.36	0.00	1.64	3.26	3.55	2.50	5.12	4.75	2.06	0.30	0.64	24.32
1888	0.26	1.58	1.62	1.60	1.58	4.17	3.56	5.66	2.10	0.99	0.20	0.62	23.94
Mean..	0.50	0.92	0.84	1.95	3.16	3.94	3.68	3.51	2.96	1.68	1.27	0.77	25.18

*Precipitation (inches and hundredths) observed at Fort Benton, Mont., by assistant surgeons, U. S. Army, and Signal Service observers.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1869 ..											0.26	0.76	.....
1870 ..	1.00	0.42	0.15	0.06	2.41	0.63	0.80	0.71	0.32	0.41	0.14	0.22	7.27
1871 ..	0.50	0.38	0.48	1.48	1.58	0.11	0.93	0.10	0.46	0.71	0.65	0.50	8.68
1872 ..	0.27	0.34	0.82	0.67	0.64	1.14	4.62	0.61	1.82	0.19	0.61	0.59	12.32
1873 ..	0.60	0.65	0.33	1.14	3.03	1.17	1.29	1.59	0.58	0.19	0.86	0.12	11.95
1874 ..	0.67	0.10	0.64	0.43	2.98	2.13	0.10	1.17	0.49	0.56	0.58	0.60	10.45
1875 ..	0.66	1.11	0.22	1.04	1.66	2.57	2.24	1.19	0.13	0.71	0.85	0.43	12.75
1876 ..	0.71	0.28	1.53	1.25	11.06	1.45	2.31	1.45	0.39	0.24	0.33	0.09	21.10
1877 ..	0.72	0.11	0.60	1.04	4.58	1.44	1.94	0.80	0.90	0.43	0.45	0.00	13.01
1878 ..	0.30	0.05	0.30	3.24	5.25	2.26	1.31	0.16	2.32	1.18	0.09	0.59	16.86
1879 ..	0.22	0.74	0.14	1.36	4.08	4.98	1.98	1.56	0.18	0.60	0.06	1.40	17.30
1880 ..	0.34	0.64	0.36	1.80	1.54	4.50	1.12	1.56	0.32	1.09	1.44	1.39	16.00
1881 ..	2.27	0.66	0.29	0.18	1.43	3.46	2.28	1.18	1.32	1.94	1.73	0.07	16.81
1882 ..	0.75	0.38	1.09	1.22	0.35	0.13	0.85	0.27	2.89	0.86	0.39	1.00	10.18
1883 ..	0.75	0.45	1.34	1.02	3.31	1.93	0.16	1.01	0.93	1.64	0.36	0.11	13.01
1884 ..	0.56	0.45*	0.61*	1.23*	1.09	2.18	3.09	0.79	1.44	0.36	0.29	1.01	13.13
1885 ..	0.94	0.60	0.40	0.64	0.48	5.66	2.82	1.81	0.25	0.37	0.65	0.68	14.94
1886 ..	0.67	0.65	0.70	2.01	0.36	1.53	0.90	0.66	1.24	.....	.....	.....	.....
Mean..	0.69	0.47	0.58	1.17	2.69	2.22	1.69	0.98	0.94	0.72	0.57	0.59	13.30

\*Interpolated.

*Precipitation (inches and hundredths) observed at Genoa, Nebr., by George S. Truman, voluntary observer.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1875	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1876	0.50	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1877	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1878	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1879	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1880	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1881	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1882	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1883	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1884	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1885	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1886	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1887	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1888	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
1889	0.55	0.75	3.55	3.20	3.20	3.50	7.45	1.70	5.90	1.80	0.80	0.00	31.90
Mean..	0.87	0.65	1.20	2.70	4.20	4.21	4.45	2.45	3.35	1.58	0.68	0.85	27.19

*Precipitation (inches and hundredths) observed at Helena, Mont., by Signal Service and Smithsonian observers.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1866 ...	3.10	0.47	1.76	2.20	4.30	3.50	0.70	0.20	1.80	2.61	0.50	1.00	22.14
1867 ...	1.46	0.60	1.30	.....	.....	.....	.....	.....	.....	.....	6.90	.....	.....
1868 ...	1.00	0.32	0.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1869 .....	.....	.....	.....	.....	.....	0.95	0.25	0.30	0.10	0.00	.....	.....	.....
1880 .....	.....	.....	.....	2.22	1.24	0.46	0.86	1.38	0.00	1.23	0.87	4.64	.....
1881 .....	2.86	0.51	0.00	1.55	1.60	3.51	1.95	1.78	2.49	2.04	1.27	0.38	19.94
1882 .....	1.08	0.37	0.31	0.94	0.54	1.18	0.36	0.15	3.66	1.10	1.15	0.48	10.32
1883 .....	0.57	0.73	0.73	0.53	1.54	1.74	0.32	.....	.....	.....	0.66	1.02	.....
1884 .....	3.75	1.33	0.59	1.06	0.63	4.29	3.25	0.47	1.30	0.49	0.46	1.56	19.18
1885 .....	1.31	0.82	0.28	1.00	0.85	4.46	1.16	0.48	0.11	0.16	0.15	0.21	10.95
1886 .....	0.82	0.56	1.00	2.69	0.40	1.14	0.55	0.03	2.40	1.57	0.49	0.98	12.03
1887 .....	1.35	0.01	0.12	1.93	2.41	3.48	0.27	1.86	0.50	1.01	0.22	0.29	14.65
1888 .....	0.79	0.12	1.32	0.56	2.96	1.87	0.89	0.26	0.14	0.14	0.32	0.77	10.14
1889 .....	0.42	0.72	0.64	0.11	2.20	0.40	0.34	0.31	.....	.....	.....	.....	.....
Mean..	1.54	0.60	0.75	1.34	1.70	2.25	0.91	0.66	1.25	1.04	1.09	1.13	14.26

*Precipitation (inches and hundredths) observed at Fort Ellis, Mont., by assistant surgeons, U. S. Army.*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1868	.....	.....	.....	.....	.....	.....	.....	0.88	2.12	0.32	0.91	2.86	.....
1869	1.15	1.45	2.90	3.13	5.01	2.65	0.85	0.00	0.54	0.40	0.13	0.63	19.54
1870	0.06	0.11	0.65	0.54	0.18	0.61	0.00	.....	.....	.....	.....	.....	.....
1872	.....	.....	.....	.....	.....	.....	.....	1.04	2.61	0.43	0.02	0.20	.....
1873	0.38	0.30	1.02	0.80	1.86	5.90	.....	1.21	0.58	0.93	0.51	0.86	.....
1874	0.37	0.78	1.54	5.16	2.58	0.49	2.73	1.58	1.04	0.90	1.04	19.75	.....
1875	0.80	1.13	0.85	0.56	5.60	2.90	1.56	3.22	0.66	0.87	1.07	0.19	19.41
1876	0.07	0.47	1.13	0.99	7.10	2.38	0.21	2.32	0.54	0.84	1.66	1.07	18.58
1877	0.48	0.77	0.76	1.11	4.02	2.39	0.77	0.40	2.59	1.50	1.00	0.10	15.86
1878	0.35	0.55	1.01	1.40	6.03	3.34	0.63	0.87	2.78	1.83	0.08	1.72	20.20
1879	1.20	1.42	2.77	2.06	1.89	3.63	0.48	0.53	0.38	1.64	0.30	4.78	21.08
1880	0.87	1.82	2.20	4.24	7.13	8.01	1.16	0.34	0.28	2.05	1.32	0.74	30.16
1881	2.53	0.83	1.17	2.25	1.44	1.74	1.24	0.84	1.12	1.89	2.43	0.07	17.55
1882	1.03	1.01	2.50	2.62	2.94	3.03	1.16	0.33	2.21	0.90	0.69	0.56	19.28
1883	1.30	0.68	0.71	1.00	2.04	2.45	4.01	2.01	1.05	2.07	0.88	1.12	15.72
1884	1.25	0.75	0.82	1.31	2.98	3.50	2.48	1.10	4.65	1.38	0.00	1.80	22.02
1885	0.63	1.40	0.54	1.04	12.26	7.35	3.61	1.25	1.20	1.50	1.10	0.75	32.63
1886	0.88	1.16	1.68	3.78	1.45	2.83	1.18	1.01	.....	.....	.....	.....	.....
Mean..	0.83	0.89	1.39	1.71	4.31	3.46	1.08	1.18	1.55	1.21	0.81	1.17	19.5

Mean temperature (degrees Fahr.) observed at Steubenville, Ohio, by R. Marsh and J. B. Doyle, Smithsonian observers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1830													36.7
1831	28.7	30.5	48.1	54.5	67.1	73.6	72.9	71.1	62.9	55.8	41.0	20.7	52.0
1832	29.3	35.8	42.6	51.5	61.2	71.9	72.7	70.2	63.2	54.1	42.2	33.8	51.4
1833	34.3	30.7	37.1	55.5	66.7	66.5	74.6	71.3	64.6	48.1	38.7	34.7	54.9
1834	31.2	38.7	42.0	54.5	60.7	69.0	70.7	71.7	62.4	49.8	41.0	34.7	52.3
1835	27.3	23.4	38.3	49.4	62.5	70.2	70.0	68.5	56.7	53.7	42.3	29.0	49.6
1836	28.0	21.3	33.7	51.7	65.7	69.3	74.0	68.5	66.2	44.8	36.7	28.6	49.2
1837	26.2	31.8	38.2	44.8	59.6	67.5	72.1	70.0	61.3	52.4	44.2	32.6	50.1
1838	33.3	19.4	43.2	42.6	50.9	72.6	75.5	75.9	65.2	47.6	35.7	25.6	51.6
1839	32.0	33.7	39.6	56.5	63.2	64.7	74.7	69.7	58.9	56.8	36.3	31.1	49.4
1840	32.2	39.5	41.5	54.7	62.7	72.2	73.9	72.7	60.7	53.5	39.3	29.5	52.0
1841	29.5	29.1	37.9	47.7	58.3	74.4	73.3	71.8	67.4	47.2	40.7	33.4	50.9
1842	33.5	37.0	47.2	54.6	58.0	66.4	72.7	68.6	64.5	51.2	36.2	31.0	51.7
1843	35.8	24.7	27.7	50.5	59.3	69.7	74.7	72.5	68.0	46.9	38.0	34.0	50.2
1844	27.9	33.3	41.1	62.1	64.5	69.4	75.8	70.5	64.8	48.9	41.0	29.9	53.4
1845	34.3	35.8	42.7	56.8	62.0	70.8	72.7	74.5	65.4	50.4	39.3	24.8	52.2
1846	31.5	29.8	43.1	55.2	65.8	68.9	73.3	75.3	70.0	51.3	45.7	35.3	51.7
1847	29.8	32.8	38.6	52.3	64.2	68.3	74.0	72.0	63.2	50.5	43.0	33.6	51.1
1848	35.3	33.2	38.3	52.1	64.5	70.2	72.3	71.8	59.4	52.5	37.7	40.6	52.5
1849	30.0	29.2	43.0	50.1	61.9	73.8	73.9	73.0	64.0	52.3	48.2	30.8	52.3
1850	35.2	33.5	38.5	48.0	55.7	70.9	78.7	73.9	64.7	52.0	44.7	33.5	53.4
1851	34.7	40.0	45.3	50.5	62.7	68.8	74.3	71.3	67.5	53.7	39.0	28.3	53.0
1852	25.7	33.7	41.3	47.2	63.1	69.0	75.9	72.0	63.9	57.9	40.2	37.8	52.3
1853	31.0	33.0	39.7	50.9	62.3	76.2	73.3	73.3	65.2	51.0	46.5	31.7	52.8
1854	30.2	34.7	42.4	51.0	63.0	73.0	82.2	79.7	73.2	56.8	39.7	30.3	54.7
1855	31.7	21.9	35.7	53.2	63.1	67.5	77.1	71.7	70.3	49.3	45.0	31.3	51.5
1856	16.7	21.7	28.6	53.0	60.2	74.5	78.0	69.7	64.2	52.1	39.8	26.6	48.8
1857	16.3	40.7	35.5	40.5	58.1	70.0	74.2	70.8	65.2	50.5	37.3	36.2	49.6
1858	30.7	28.2	37.8	51.7	59.3	73.1	76.2	72.4	62.7	55.5	38.0	37.7	52.4
1859	30.7	34.2	45.1	47.3	59.3	67.2	74.0	70.0	61.9	47.7	41.0	27.8	51.1
1860	30.0	32.0	41.5	50.8	65.2	69.2	74.1	71.7	61.0	53.7	38.4	29.1	51.4
1861	29.4	36.0	39.0	51.2	57.2	73.2	70.7	72.4	65.3	54.7	41.0	36.5	52.2
1862	31.9	31.3	39.7	51.8	61.4	68.5	74.9	75.6	68.5	54.6	41.1	34.0	52.8
1863	32.8	32.6	36.6	49.3	64.7	68.8	75.5	76.3	63.0	50.2	43.6	34.6	52.3
1864	27.5	32.3	36.3	49.2	64.0	69.3	78.6	74.7	62.2	50.5	42.0	31.9	51.6
1865	28.3	32.0	45.5	55.0	62.3	76.7	73.9	71.0	71.3	51.5	41.5	34.4	53.3
1866	28.3	30.2	37.7	57.0	60.4	73.7	79.7	68.8	64.5	54.8	43.2	28.3	52.2
1867	20.3	38.3	36.1	53.7	57.6	77.0	76.7	75.4	69.8	55.8	44.7	31.3	53.0
1868	26.3	27.8	43.8	48.5	60.8	73.0	82.2	75.5	64.1	52.1	43.3	30.9	51.9
1869	36.1	35.1	35.2	51.0	61.5	71.0	75.4	76.2	68.1	48.0	37.3	35.7	52.6
1870	35.7	31.8	37.0	55.0	67.3	73.5	77.3	74.6	68.7	55.7	42.7	30.8	54.2
1871	32.7	35.0	47.7	56.6	65.8	73.5	73.6	75.3	61.0				.....
Mean.	29.9	31.9	39.7	51.7	62.0	70.9	75.1	72.5	64.7	51.9	40.9	32.0	51.9



Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.								Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind.				Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths.		Length of record, years.	Temperature data since opening of station.			
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.					Total movement, miles.	Prevailing direction.	Maximum velocity.						8 a. m.	s. p. m.		Absolute maximum.	Year.	Absolute minimum.	Year.
																			Miles per hour.	Direction.											
<b>New England.</b>																															
Eastport	53	29-97	30-03	0.62	60-3	-0.7	76	66-3	50	54-3	19	3	54-6	85-2	2-00	-1.39	4,505	SW.	40	e.	15	10	10	11	11-4-2-2-0	17	88	1880	45	1880	
Green Mountain	1541	29-44	30-05	0.62	59-9	-0.6	72	65-3	46	54-5	23	4	55-4	86-6	1-30	.....	12,317	SW.	60	SW.	10	10	11	11	11-3-0-2-8	17	72	1889	46	1888	
Portland	99	29-93	30-03	0.62	64-6	-3-4	72	72-2	47	57-2	23	3	58-0	83-4	2-75	-0.99	4,395	SW.	28	e.	14	10	11	10	9-5-4-4-3	18	95	1876	47	1880	
Manchester	247	29-81	30-06	0.61	65-7	.....	85	75-4	43	55-8	24	3	57-0	79-4	1-72	.....	2,720	NW.	16	W.	24	15	8	7	10-4-0-3-3	3	91	1888	43	1880	
Mt Washington	6279	29-93	30-08	0.53	44-8	-1-2	58	49-4	28	40-1	16	3	47-2	89-6	1-78	-0.18	18,515	W.	62	NW.	11	4	7	20	19-2-4-3-0	18	74	1872	20	1876	
Mt Killington	.....	26-16	30-08	0.54	61-4	.....	83	58-2	35	46-5	20	7	55-6	81-4	1-50	.....	15,420	SW.	55	S.	22	10	13	11	13-5-6-2-8	3	85	1888	37	1880	
Northfield	871	29-12	30-04	0.60	61-3	.....	83	73-2	40	50-4	23	5	55-6	78-6	1-05	.....	4,439	SW.	38	S.	17	6	8	5	10-5-7-4-9	19	96	1881	47	1880	
Boston	125	29-94	30-07	0.58	67-4	-1-6	84	73-8	52	63-0	14	4	62-4	86-6	1-15	-0.17	6,267	SW.	35	S.	10	13	11	10	9-6-7-4-3	3	83	1887	53	1880	
Nantucket	14	29-06	30-08	0.58	67-7	.....	78	71-8	56	63-0	16	4	62-4	86-7	1-31	-0.13	8,693	SW.	38	SW.	13	7	11	8	8-6-2-4-3	12	85	1876	52	*	
Wood's Holl	22	29-06	30-08	0.59	67-7	.....	78	72-2	56	63-0	14	4	63-3	87-8	1-37	-0.13	10,442	SW.	48	NE.	26	10	12	9	11-6-2-3-5	9	82	1887	49	1880	
Block Island	25	29-05	30-08	0.59	67-4	-0-6	82	71-9	56	63-0	17	4	63-3	87-8	1-37	-0.13	10,442	SW.	48	NE.	26	10	12	9	11-6-2-3-5	9	82	1887	49	1880	
Narragansett Pier	22	29-06	30-08	0.59	67-4	-0-6	82	71-9	56	63-0	17	4	63-3	87-8	1-37	-0.13	10,442	SW.	48	NE.	26	10	12	9	11-6-2-3-5	9	82	1887	49	1880	
New Haven	107	29-96	30-07	0.59	68-5	-0-5	85	76-8	50	60-2	26	6	60-8	80-6	1-28	-1-55	4,572	SW.	21	NE.	26	11	14	6	10-5-4-3-7	17	91	1888	45	1880	
New London	47	30-00	30-05	0.60	69-0	0-0-0	83	75-3	53	62-7	22	3	61-0	78-6	1-12	-0-05	4,905	SW.	22	SW.	1	10	10	11	11-4-8-5-4	17	90	1887	48	1880	
<b>Mid. Atlantic States.</b>																															

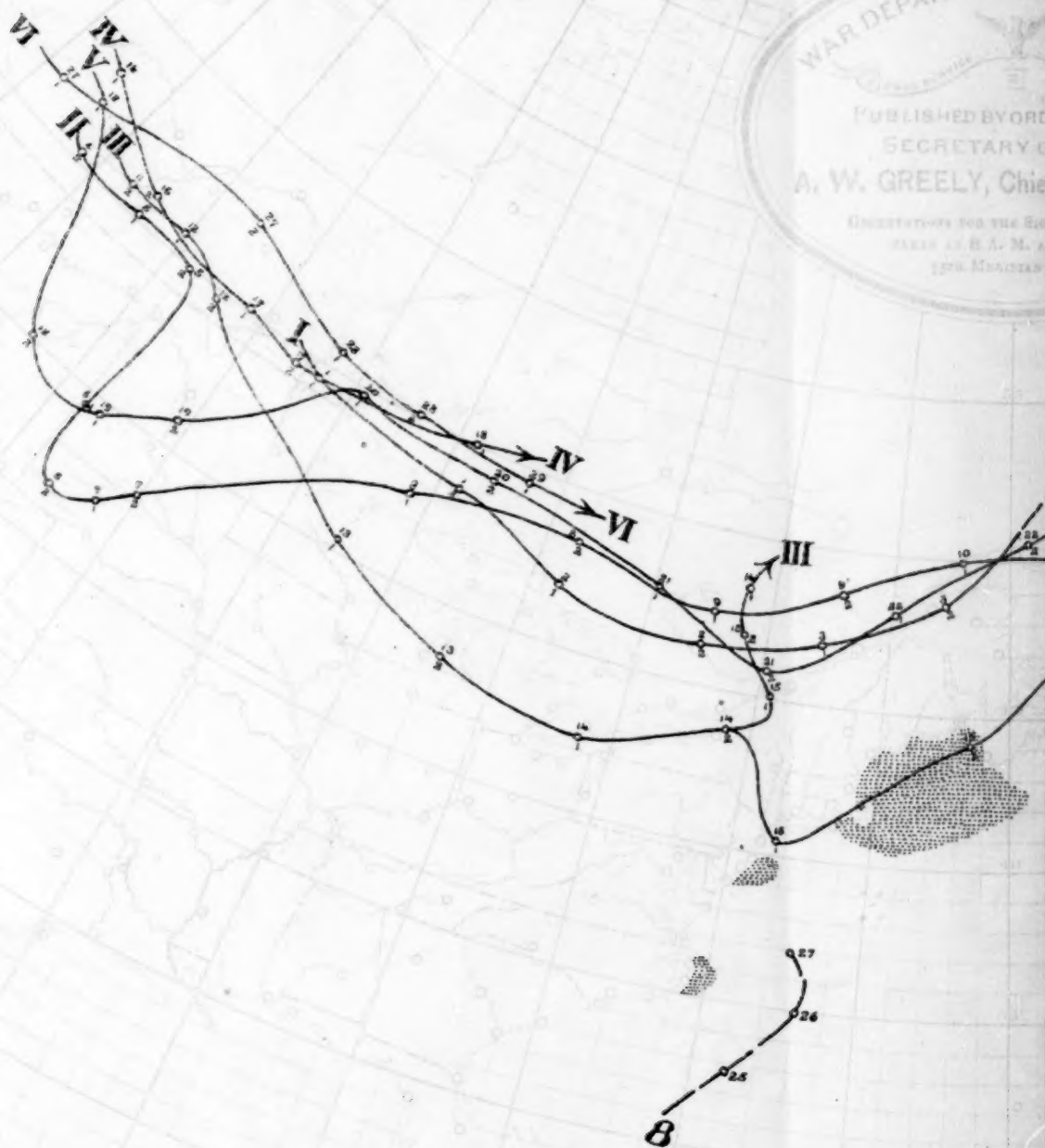
Table of miscellaneous meteorological data for August, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above level, feet.	Pressure, in inches.		Temperature of air, in degrees Fahrenheit.										Precipitation, in inches.		Departure from normal precipitation.	Wind.			Total movement, miles.	Prevailing direction.	Maximum velocity.			Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths.		Length of record, years.	Temperature data since opening of station.																																																																																																																																																																																																																																																																																																																																																																																																										
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.		Miles per hour.	Direction.	Date.			Direction.	Date.	Direction.					Date.	Direction.		Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date.	Direction.	Date



# Chart I. Tracks of Areas of

WAR DEPARTMENT  
PUBLISHED BY ORDER  
SECRETARY OF WAR  
A. W. GREELY, Chief  
DIRECTOR OF THE BUREAU  
OF METEOROLOGY  
WASHINGTON



## NOTES.

The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate, respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations.

The dotted shading ( ) indicates fog belts.

The ruled shading ( ) indicates the position in which field-ice and icebergs were observed.

of Low Pressure. August, 1889.

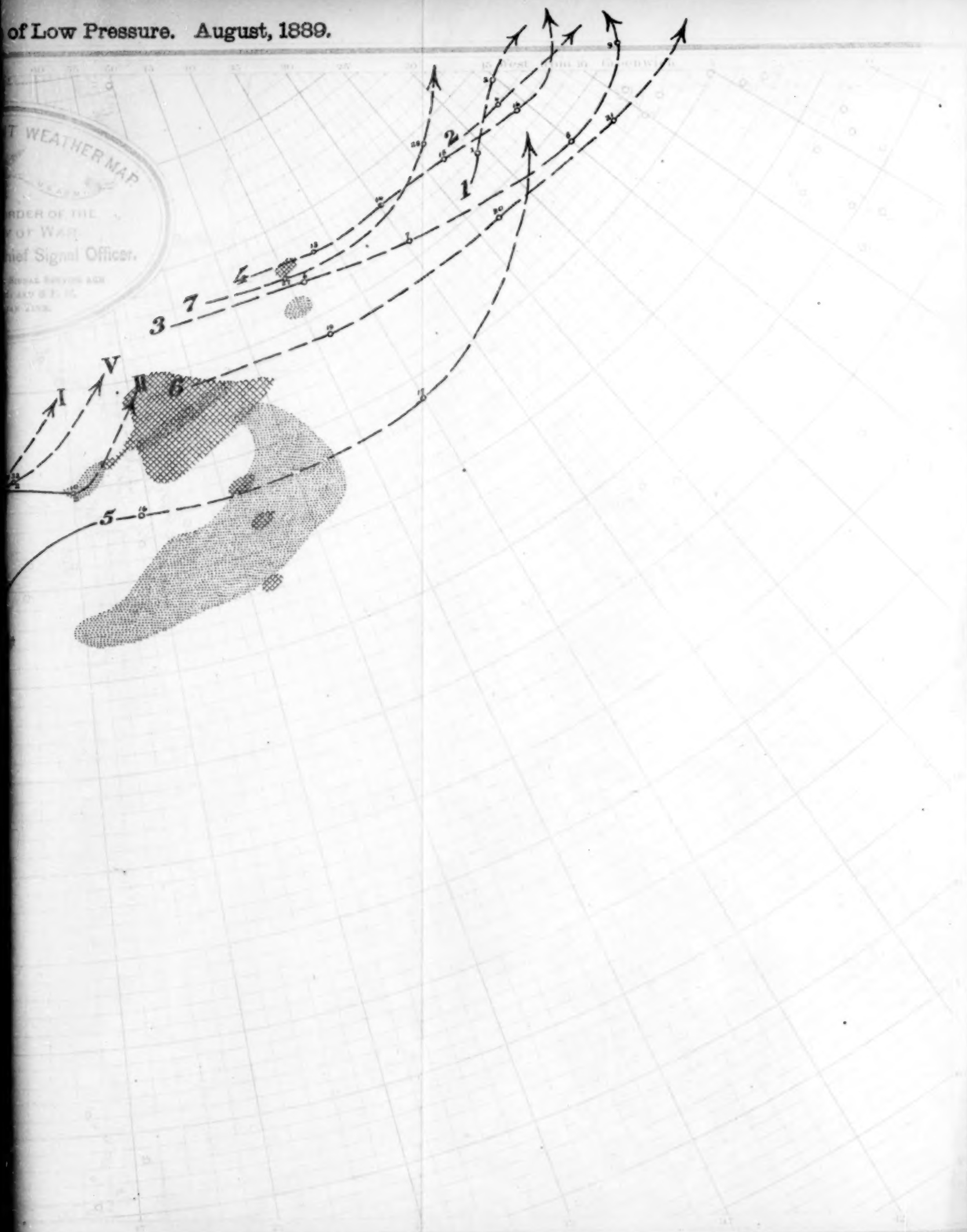
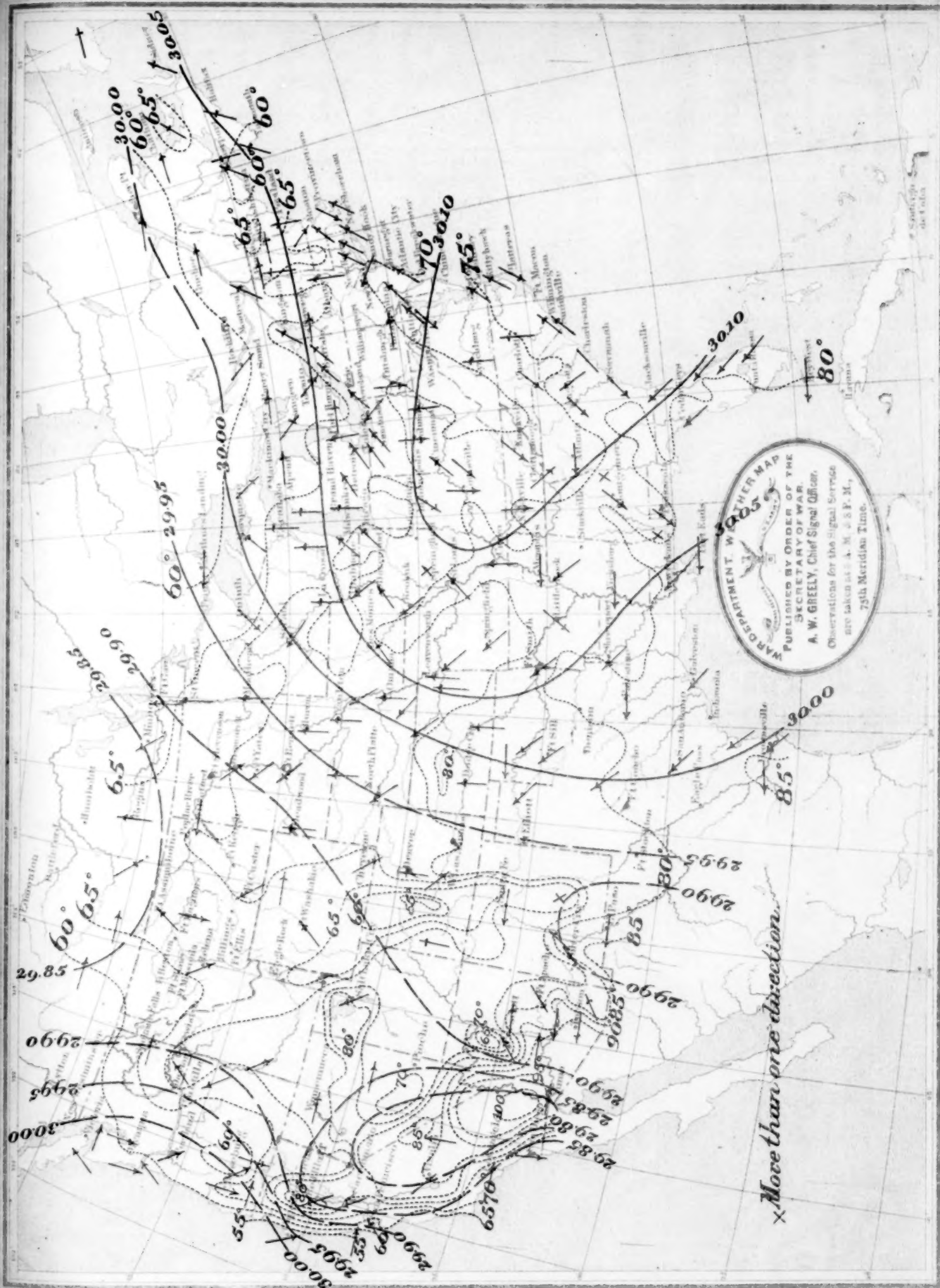




Chart II. Isobars, Isotherms, and Winds. August, 1889.

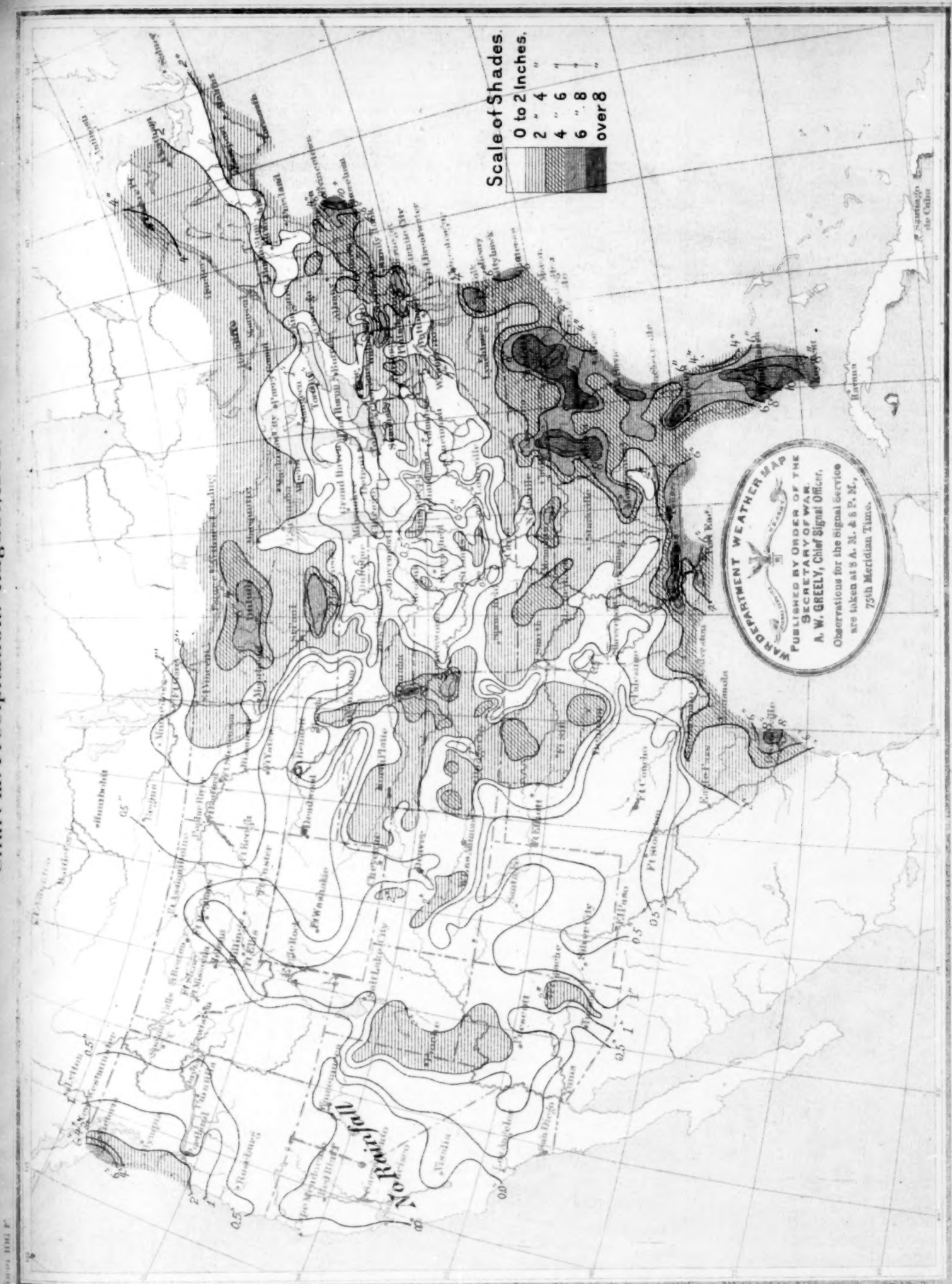


*x More than one direction.*





Chart III. Precipitation. August, 1889.



[illegible]



*List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Reports have not been received from those marked with an asterisk (\*) in time to be used in the Review for August, 1889.*

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
<p><b>ALABAMA.</b> Auburn, Ala. Weather Service. Bermuda, Wm. Fowler. Citronelle, J. G. Michael. Columbiana, W. D. Lovett. Livingston, Prof. J. W. A. Wright. Laverne, J. O. Sentell. Mesa, A. M. Weiler. Mount Willing, W. M. Garrett. Valley Head, E. P. Nicholson, M. D. Wiggins, M. D. Jones.</p> <p><b>ARIZONA.</b> Antelope Valley, Mrs. J. H. Hamilton. Ash Canyon, Jno. S. Robbins. Bangharts, Geo. Banghart. Cedar Springs, R. E. Norton. Coolley's, C. E. Coolley. Curtis, Dr. R. B. Tripp. Fairbank, S. W. Wood. Flagstaff, M. J. Jordan. Florence, A. T. Colton, C. E. Gila Bend, David Murphy. Globe, J. H. Hamill. Holbrook, David Rope. Litchfield, C. Cameron. Mount Huachuca, J. W. Stump. New River, J. F. Singleton. Tucson, Miss Mary Tevis. Tip Top, F. E. Wager. Tombstone, S. C. Bogg. Tucson, Edward L. Wetmore. Signal, Wm. Koshland. Strawberry, L. P. Nash. Volunteer Spgs, W. J. Hill. Walnut Grove, T. B. Carter. Williams, J. T. Ryan. Willow Springs, F. A. Chamberlin. Winslow, C. J. Dillon.</p> <p><b>ARKANSAS.</b> Lead Hill, Silas C. Turnbo. Little Rock, Arkansas Weather Service. Winslow, Albert Dunlap.</p> <p><b>CALIFORNIA.</b> American Hill, C. F. Macy. Anderson, Dr. A. Fouch. Barstow, Geo. R. Gooding. Berkeley, Prof. F. Soule. Centerville, Wm. Barry. Collegeville, Seward Cole. Evanston, D. S. Shotwell. Evergreen, S. Holland. Georgetown, C. M. Fitzgerald. Grass Valley, B. F. Berriman. Hydenville, E. T. Foss. Jowa Hill, L. T. Dwight. Jolon, T. T. Tidball. Julian, L. N. Bailey. La Grange, Jos. Dominica. Lewis Creek, John Tuohy. Los Banos, A. Widmann. Mount Hamilton, Lick Observatory. National City, J. E. Boal. Needles, John J. Clark. Oakland, Dr. J. B. Trembley. Oroville, Hiram Arents. Palmdale, Wellwood Murray. Sacramento, S. H. Gerrish. Salinas, Dr. E. K. Abbott. San Bernardino, A. K. Holt. San Luis Obispo, J. E. Lewis. Santa Barbara, H. D. Vail. Santa Clara, A. Block. Santa Maria, L. E. Blochman. Susanville, T. B. Sanders. Vacaville, G. O. Colburn. Walla Walla Creek, J. Titcomb. Walnut Creek, A. L. Bancroft. Wheatland, Wm. Lumbard. Willow, David Bentley.</p> <p><b>COLORADO.</b> Bennet, I. S. Putnam. Colorado Springs, Colo. Weather Service. Coulter, Capt. Jesse E. Glick. Delta, J. A. Curtis. Denver, Rev. Wm. Forstall. Fraser, L. D. C. Gaskill. Fort Collins, Prof. L. G. Carpenter. Grand Lake, Jas. Cairns. Georgetown, W. A. Jayne, M. D. Greeley, E. Bethel. Palmer Lake, Thos. Gaddis, M. D. Rocky Ford, F. Watrous.</p> <p><b>CONNECTICUT.</b> Hartford, W. W. Ellsworth. New Hartford, Rev. Wm. Goodwin. Vinton, Rev. E. Dewharst.</p> <p><b>DAKOTA.</b> Alexandria, L. C. Taylor. Armour, Jno. J. Angus. Brookings, Prof. Lewis McLouth. Canon, W. M. Cappett. Carrington, H. M. Durbrow. Clark, W. H. Boals. Davenport, J. W. Leech. De Smet, Thos. H. Ruth. Gallatin, B. J. Pound. Garden City, W. C. T. Newell.</p>	<p><b>DAKOTA—Continued.</b> Huron, Dakota Weather Service. Kimball, A. S. Stuver. Napoleon, J. H. Hoof. New England City, E. S. Clough. Onida, Mrs. M. F. Goddard. Parkston, John J. Swartz. Redfield, ———. Roscoe, C. H. Spencer. Spearfish, J. H. Warren. Spring Lake, A. Gould. Steele, F. R. Hill. Wahpeton, C. I. Croft. Webster, Arthur Betts. Wolsey, G. W. Frink. Woonsocket, L. O. Libbey.</p> <p><b>DELAWARE.</b> Kirkwood, Wm. Carnagy.</p> <p><b>DISTRICT OF COLUMBIA.</b> Kendall Green, Deaf and Dumb Institute.</p> <p><b>FLORIDA.</b> Altamonte Spgs, M. E. Bingham. Alva, Chas. E. Robins. Archer, A. F. Wyman. Fort Meade, A. H. Adams. Homeland, J. S. Wade. Kissimmee, E. E. W. Brewster. Lake City, Dr. J. C. Neal. Manatee, Mrs. Mary W. Broberg. Matanzas, Mrs. B. E. Dupont. Merritt's Island, Rev. J. H. White. Tallahassee, Rev. Dr. W. H. Carter. Villa City, J. Emory Round.</p> <p><b>GEORGIA.</b> Andersonville, H. W. Bryant. Athens, Prof. L. H. Charbonnier. Diamond, Wm. Kimsey. Duck, A. L. Gillespie. Forsyth, Thos. G. Scott. Gillsville, C. W. Meaders. Hephzibah, R. L. Rhodes. Marietta, G. S. Owen. Milledgeville, S. A. Cook. Point Peter, G. M. Witcher. Quitman, J. L. Cutler. Thomasville, C. S. Boudurant. Woolley's Ford, A. J. Julian.</p> <p><b>IDAHO.</b> Era, Hervey Brooks. Kootenai, David McLaughlin. Lewiston, Robert Schleicher. Soda Springs, L. C. Eastman.</p> <p><b>ILLINOIS.</b> Charleston, J. B. Dazey. Collinsville, Dr. J. L. R. Wadsworth. Mattoon, Wm. Dozier. Mount Morris, Wm. Feary. Oswego, John S. Seely. Palestine, John E. Templeton. Pekin, Rev. J. E. Terborg. Peoria, Dr. Fred. Brendle. Philo, H. A. Burr. Riley, John W. James. Rockford, T. D. Robertson. Sandwich, Dr. N. E. Ballou. South Evanston, Dr. M. D. Ewell. Springfield, Ill. Weather Service. Sycamore, Roswell Dow. Windsor, A. H. Hatch.</p> <p><b>INDIANA.</b> Butler, C. F. Hole. Dana, J. E. Wright. Huntstown, J. C. Hunter. Jeffersonville, J. C. Loomis. Lacoma, L. F. Crozier. La Fayette, Ind. Weather Service. La Fayette, Purdue Institute. Maury, Elwood Kirkwood. New Providence, Prof. E. S. Hallett. Point Isabel, Jas. F. Hood. Scalesville, Urias Wilson. Sunman, Dr. E. B. Vincent. Vevay, Prof. Chas. Boerner.</p> <p><b>INDIAN TERRITORY.</b> Caddo Creek, B. Leming, M. D. Guthrie, Morris Collar. Jintown, M. M. Yeakly. Lehigh, F. M. Madden. Oklahoma, C. F. Sommer.</p> <p><b>IOWA.</b> Amana, Conrad Schadt. Ames, J. Rush Lincoln. Bancroft, H. N. Renfrew. Blakeville, James Rogers. Cedar Rapids, H. D. Olds. Clarinda, A. S. VanSandt. Clinton, Luke Roberts. Cresco, Gregory Marshall. Cromwell, Harry C. Harrison. Des Moines, G. B. Brackett. Des Moines, Adolphus Voegel. Des Moines, Iowa Weather Crop Bulletin Service. Dunkerton, J. W. Boyle. Dysart, Jos. Dysart. Eagle Grove, C. A. Schaffer. Elkader, J. N. Hamilton. Fayette, R. Z. Latimer.</p>	<p><b>IOWA—Continued.</b> Fort Madison, Miss. L. A. McCready. Gillett, H. L. Pierce. Glenwood, Seth Dean. Glenwood, A. Schappel. Grinnell, Prof. S. J. Buck. Hampton, E. C. Grenelle. Humboldt, Miss Florence Prouty. Independence, Emil F. Wulke. Iowa City, Prof. A. A. Veblen. Jefferson, S. M. Taylor. Logan, Mrs. M. B. Stern. McGregor, A. F. Hofer. Manson, W. L. Thompson. Maquoketa, A. B. Bowers, M. D. Monticello, H. D. Smith. Mount Pleasant, Dr. Max E. Witte. Mt. Vernon, Prof. Alonzo Collin. Muscatine, J. P. Walton. Ossage, G. D. Pittingill. Oskaloosa, Joseph Boyd. Oskaloosa, O. H. Avey. Sac City, Dr. Caleb Brown. Vinton, T. F. McCune. Washington, Wm. A. Cook. Weber City, C. M. Trumbauer. Westley, Wm. Ward.</p> <p><b>KANSAS.</b> Allison, John J. Cass. Bendena, G. Campbell. Cawker City, A. G. Alrich. Colby, C. E. Bennett. Cunningham, E. Shaw. Elk Falls, Dr. A. C. Williams. Emporia, Prof. T. H. Dinamore, jr. Englewood, C. D. Perry. Freemont, E. Atkin. Gibson, C. M. Bell. Globe, Wm. Featherston. Havensville, L. W. Dennen. Independence, J. M. Altaffer. La Harpe, Isaac S. Coe. Lawrence, Prof. F. H. Snow. Lebo, C. B. Jennings. Leoti, R. A. Ramey. Macksville, C. E. Poling. Manhattan, C. P. Blachley. Manhattan, F. J. Rogers. Morse, R. P. Edgington. Rago, D. S. Stratton. Rome, D. M. Adams. Salina, J. H. Gibson. Santa Fe, Judge A. P. Heminger. Sedan, J. W. Goodell. Topeka, Kansas Weather Service. Tribune, S. B. Jackson. Wabek, Wm. P. Cochran. Wellington, John H. Wolfe. Yates Center, F. B. Gray.</p> <p><b>KENTUCKY.</b> Ashland, J. M. Ferguson. Bernstadt, John de Planta. Bowling Green, M. H. Crump. Canton, C. H. Major. Earlington, J. B. Atkinson. Falmouth, F. G. Heid. Frankfort, E. C. Went. Franklin, T. W. MacGill. Louisville, Ky. Weather Service. McHenry, M. G. Duncan. Madisonville, T. J. Gill. Millersburg, Rev. C. Pope. Mount Sterling, H. C. McKee. Owensboro, Watkins &amp; Carter. Owenton, J. S. Cox. Pellville, Oscar Haynes. Richmond, Prof. O. A. Kennedy. Shelbyville, H. W. Prissler. South Fork, A. B. Gilbert. Springfield, W. U. Ray.</p> <p><b>LOUISIANA.</b> Cameron, Hon. S. P. Henry. Emilie, Dr. L. D. Chauff. (S. J.) Grand Coteau, Rev. Jos. A. Ruby. Houma, H. F. Belanger. Liberty Hill, E. A. Crawford. Luling, F. M. Rogers. Marksville, Leon Molnar. New Iberia, Mrs. J. A. Gebert. New Orleans, La. Weather Service. Point à la Hache, F. C. Myers. Winnfield, J. M. McCain.</p> <p><b>MAINE.</b> Bar Harbor, Joseph Wood. Cornish, Silas West. Gardiner, Henry Richards. Kent's Hill, W. C. Strong. Orono, Prof. M. C. Fernald.</p> <p><b>MARYLAND.</b> Barren Creek Springs, Albert E. Acworth. Cumberland, E. T. Shriver. Fallston, Prof. G. G. Curtis. Frederick, McClintock Young. Gaithersburg, J. T. De Sellum. Galena, Henry Parr. Gambrills, J. E. Moque. Jewell, Jos. Plummer.</p>	<p><b>MARYLAND—Continued.</b> McDonogh, McDonogh Institute. Mt. St. Mary's, Mt. St. Mary's College. Woodstock, Woodstock College.</p> <p><b>MASSACHUSETTS.</b> Amherst, Miss S. C. Snell. Amherst, Mass. Agricultural Experimental Station. Blue Hill, Rev. A. K. Teele. Blue Hill Observatory, A. L. Rotch. Cambridge, Harvard College Observatory. Chestnut Hill, D. Fitzgerald. Dudley, Conant Observatory. Fall River, C. V. S. Remington. Heath, B. B. Cutler. Holyoke, J. W. Doran. Leicester, Arthur Kendrick. Nahant, Dr. Wm. D. Hodges. New Bedford, Thos. R. Rodman. Newburyport, F. V. Pike. North Billerica, C. H. Kohlrausch. Provincetown, John R. Smith. Royalston, Miss Lizzie W. Chase. Somerset, Elisha Slade. Taunton, E. U. Jones, M. D. Westborough, G. S. Newcomb. Williamstown, Williams College Observatory. Worcester, J. B. Hall.</p> <p><b>MICHIGAN.</b> Berrien Springs, F. A. Zerby. Birmingham, S. Alexander. Harrisonville, Dr. D. W. Mitchell. Hudson, Major A. H. Boies. Kalamazoo, W. A. Black. Lansing, Dr. H. B. Baker. Lansing, Mich. Weather Service. Marshall, G. H. Greener, M. D. Mottville, J. A. Hartaler. Thornville, John S. Caulkins. Traverse City, S. E. Wait. Ypsilanti, J. C. Bemiss. Ypsilanti, C. S. Woodard.</p> <p><b>MINNESOTA.</b> Le Sueur, L. B. Davis. Minneapolis, Wm. Cheney. Northfield, G. H. Alden. Saint Paul, Minnesota Weather Service.</p> <p><b>MISSISSIPPI.</b> Bonneville, A. G. Smith. Fayette (near), I. N. Bedford. Kosciusko, L. Heyman. Logtown, C. D. Koch. Louisville, B. T. Webster. Macon, A. T. Dent. Pontotoc, C. W. Bolton, M. D. Summit, J. N. Teunisson. University, Mississippi Weather Service. Waynesborough, W. S. Daries.</p> <p><b>MISSOURI.</b> Columbia, Mo. Weather Service. Conception, Rev. Fr. Paul. Excelsior Springs, A. Reinisch. Fayette, Prof. T. Berry Smith. Frankford, W. W. Vermillion. Glasgow, Prof. C. W. Pritchett. Grand Pass, E. R. Graham. Harrisonville, A. J. Sharpe. Hermann, Chas. Maushund. Kansas City, S. J. Spurgeon. La Monte, J. S. Slaven. New Frankford, G. W. Hawkins. New Haven, Max Eimblick. Oak Ridge, Henry Bruihl. Ozark, J. J. Brown. Princeton, Dr. Wm. Hiron. St. Charles, Dr. J. R. Mudd. Savannah, H. Van Buskirk. Sedalia, C. G. Taylor. Shelbina, J. S. Chandler. Steelville, E. A. Pinnell. Willow Springs, Capt. Wm. Hugh. Withers Mill, J. R. Dudley.</p> <p><b>MONTANA.</b> Glendive, J. H. Ray. Fort Logan, Wm. Gaddis. Powder River, J. M. Graham. Sheldon, Sarah E. Sheldon. Virginia City, Eugene Stark.</p> <p><b>NEBRASKA.</b> Ansley, P. Fowle. Bingham, W. C. Wood. Brownsville, G. D. Carrington. Creighton, George Roberts. Crete, Nebraska Weather Service. Crete, G. F. Gilbert. Culbertson, Mrs. Lizzie A. Wibley. David City, E. B. Taylor. De Soto, Chas. Selts. Fairbury, Dr. I. Humphrey. Falls City, A. B. Newkirk. Freemont, Isaac E. Heaton. Genoa, George S. Truman. Gering, Jno. P. Finley. Holmesville, H. E. Sillik. Hay Springs, Wm. Waterman. Kennedy, Mrs. M. G. Ericson.</p>	<p><b>NEBRASKA—Continued.</b> Kimball, D. Henderson, Jr. Marquette, John Ellis. Mullen, F. L. Mary. North Loup, E. W. Black. Stratton, J. B. Slime. Syracuse, P. W. Risser. Tecumseh, W. L. Dunlap. Weeping Water, G. Treat.</p> <p><b>NEVADA.</b> Carson City, Chas. W. Friend. Carson City, Nevada Weather Service.</p> <p><b>NEW HAMPSHIRE.</b> Antrim, Frank W. Palmer. Berlin Mills, Q. A. Bridges. Concord, W. L. Foster. Nashua, Chas. H. Webster. North Sutton, C. E. Hosmer. Shaker Village, N. A. Briggs. Belmont, ———. Bristol, ———. Lake Village, ———. Weir's Bridge, ———. Wolfeborough, ———.</p> <p><b>NEW JERSEY.</b> Beverly, C. F. Richardson. Egg Harbor City, H. Y. Postma. Jersey City, Wright Babcock. Moorestown, Thos. J. Beans. New Brunswick, N. J. Weather Service. Readington, John Fleming. South Orange, Dr. W. J. Chandler. Woodbury, W. T. Wilson.</p> <p><b>NEW MEXICO.</b> Albuquerque, S. M. Rowe. Coolidge, B. S. Mullin. Gallinas Spring, J. E. Whitmore. Hillsborough, J. E. Smith. Las Vegas, F. W. Chatham. Los Lunas, Richard Pohl. Nogal, José M. Vega. Red Canyon (Carthage), R. H. Hills.</p> <p><b>NEW YORK.</b> Alfred Centre, F. S. Place. Angelica, J. P. Slocum. Arcade, Homer W. Clough. Ardenia, Richard B. Arden. Auburn, Geo. Casey. Boyd's Corners, Thos. Manning. Canton, Prof. Henry Priest. Constableville, R. Sanford Miller. Cooperstown, G. Pomeroy Keese. Eden, W. P. Hunt. Elmira, Gerity Brothers. Factoryville, T. P. Yates. Fleming, Robt. Warwick. Friendship, Jesse D. Rogers. Geneva, Mrs. N. S. Yates. Hess Road Station, C. H. Spaulding. Honeymead Brook (Stanfordville), James Hyatt. Humphrey, Chas. E. Whitney. Ilion, G. A. Trowbridge. Ithaca, Cornell University. Ithaca, N. Y. Weather Service. Kingston, H. A. Stone. Le Roy, Prof. F. M. Comstock. Lowville, W. Hudson Stephens. Lyons, Dr. M. A. Veeder. Middleburgh, F. X. Straub. Newfane Station, F. B. Clark. New York City, Central Park Observatory. Nineveh, W. J. Barnett. North Hammond, C. A. Wooster. Number Four, Chas. Fenton. Palermo, E. B. Bartlett. Palmyra, L. D. Cummings. Pendleton, W. D. Lovell. Perry City (near), W. H. Jeffers. Potsdam, Peter Vilas; G. W. F. Smith. Queensbury, De Witt C. Jenkins. Rome, Dr. H. C. Sutton. Saratoga Lake, Jas. P. Mills. Savona, M. S. Collier, M. D. Setauket, Selah B. Strong. Somerset, J. W. Thurber. South Canisteo, J. E. Wilson. South Kortright, D. C. Sharpe. Tannersville, H. M. Wilson, Jr., M. D. Turin, R. T. Church. Utica, Thomas Birt. Wedgewood, O. F. Corwin. White Plains, Prof. O. R. Willis.</p> <p><b>NORTH CAROLINA.</b> Asheville, Dr. Karl von Ruck. Grover, F. H. Dover. Lenoir, Dr. R. L. Beall. Mount Pleasant, H. L. T. Ludwig. Raleigh, Thos. C. Harris. Raleigh, North Carolina Weather Service. Soapstone Mountain, H. L. Kimrey. Weldon, T. A. Clark.</p>

*List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for Monthly Weather Review—Cont'd.*

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
<b>OHIO.</b> Beallsville, R. D. McGanghy. Bellevue, Wm. Sheffield. Carrollton, P. M. Herold. Cleveland, G. A. Hyde. College Hill, John W. Hammitt. *Collinwood, Wm. Smeed. Columbus, Ohio Weather Service. Demos, B. H. Ault. Elyria, C. W. Goodspeed. Garrettsville, S. M. Luther. *Glasgow, W. McBane. Jacksonborough, Dr. J. B. Owsley. Kent, P. W. Eigner. Kenton, L. J. Demarest. Leipsic, J. D. Hademann. Lordstown, W. S. Dean. Napoleon, Dr. T. C. Hunter. New Athens, Jos. Holmes. North Lewisburgh, H. D. Gowey. Orangeville, E. N. Hyde. Portsmouth, Dr. D. B. Cotton. Poland, Chas. Stewart. Shanesville, John Roth. Shiloh, Peter Bowman. Tiffin, Rev. T. H. Sondeckier. Vienna, W. D. McCormick. Wauseon, Thos. Mikesell. Westerville, Prof. John Haywood. West Milton, Luke S. Motte. Yellow Spgs, Miss Eliza G. Rice.	<b>PENNSYLVANIA—Continued.</b> Le Roy, Geo. W. T. Warburton. Meadville, David Logan. Meadhoppen, Stephen S. Jenkins. Nisbet, J. S. Gibson. Petersburg, J. E. Rooney. Philadelphia, Pennsylvania Weather Service. Philipsburgh, G. F. Dunkle. Pleasant Mount, J. D. Brennan. Quakertown, J. L. Hancock. Reading, C. M. Dechant. Salem Corners, T. B. Orchard, M. D. State College, Agricultural Ex- perimental Station. *Tipton, Miss C. J. Wilson. Troy, Rev. M. Gustin. Tuscarora, R. J. Micky. Wellsborough, Hiram D. Deming. West Chester, Dr. Jesse C. Green. <b>RHODE ISLAND.</b> Kingston, C. O. Flagg. <b>SOUTH CAROLINA.</b> *Aiken, Dr. W. H. Geddings. Cedar Springs, J. T. Bayerly. Columbia, S. C. Weather Service. Kirkwood, Colin Macrae. Port Royal, H. D. Elliott. Statesburgh, Dr. W. W. Anderson. *Simpsonville, Miss N. L. Dawson. <b>TENNESSEE.</b> Ashwood, Rev. C. F. Williams. Austin, P. B. Calhoun. *Cumberland Gap, A. A. Arthur. Milan, Dr. M. D. L. Jordan. Nashville, State Board of Health. Riddleton, F. K. Fergusson. <b>TEXAS.</b> Austin, Oscar Samosts. Austin, Q. C. Smith, M. D. *Baird, D. Richardson. Bear Creek Ranch, W. H. Potter. Belton, E. A. Sterling. Brasoria, H. Stevens. *Brenham, J. G. Sloan. Brownwood, J. F. Mayo. *Cedar Hill, J. P. Berry. Cleburne, P. J. Norwood. Coldwater, J. W. O'Brien. Colorado, Fred R. Blount. Columbia, J. L. Rogers. Corsicana, E. L. Gibson. Corsicana, W. H. Hamilton. Decatur, H. D. Donald. Duval, J. C. Edgar. Forestburgh, J. N. Morris. Fort Worth, Jas. G. Mallett.	<b>TEXAS—Continued.</b> Fredericksburgh, Arthur Strieg- ler. *Gainesville, D. F. Ragadale. Gallinas, Lum Woodruff. Galveston, Tex. Weather Service. Graham, A. B. Grant. Granbury, E. H. Snider. Hartley, E. L. McDonaugh. Howe, W. M. Smith. La Grange, Jos. Cottam. Lampasas, Dr. C. M. Ramsdell. Merkel, J. L. Vaughan. Mesquite, Silas G. Lackey. Menardville, Louis Runge. Navasota, C. E. Hull. New Braunfels, Paul Wipprecht. New Ulm, C. Runge. Pecos City, C. H. Merriman. *Roby, Crane & Keifer. Silver Falls, C. M. Telford. Snyder, A. C. Wilmoth. <b>UTAH.</b> Beaver, Rev. J. D. Gillilan. Levan, A. B. Larsen. Losce, Ephraim Caffall. Mount Carmel, Robert Moncur. Mount Pleasant, Hans C. Davidson. Nephi, W. R. May. Saint George, Seth A. Pym. <b>VERMONT.</b> Brattleborough, W. H. Childs. Burlington, W. B. Gates. *Coventry, W. H. Tibbets. East Berkshire, H. B. Lovering. Lunenburg, Dr. Hiram A. Cutting. Manchester, Rev. E. P. Wild. *Newport, M. B. Trasher. Saint Johnsbury, F. Fairbanks. Stratford, H. F. J. Scribner. <b>VIRGINIA.</b> Bolar, G. F. Eakle. *Bird's Nest, C. R. Moore. Christiansburgh, H. D. Walters. Dale Enterprise, L. J. Heatwole. Lexington, Prof. H. D. Campbell. Mossingford, R. V. Gaines. Petersburg, Jas. M. Colson, Jr. Smithfield, J. R. Purdie. Spottsville, B. W. Jones. Summit, J. R. Sim. University of Virginia, James Wearmouth. Wytheville, Howard Shriver. <b>WASHINGTON TERRITORY.</b> Blakely, R. M. Hoskinson. Vashon, Mrs. C. B. Carpenter.	<b>WEST VIRGINIA.</b> Clarksburgh, R. T. Lowndes. Ella, Henry Resaeger. *Egion, Julius Scherr. Kingwood, J. E. Murdock. Pleasant Hill, D. Titchnell. Rockport, R. D. J. Echols. Seven Pines, J. R. Sharer. Rivesville, J. T. Parsons and F. F. Prickett. Rowlesburgh, M. J. Coniff. Tannery, G. H. Trembley. Tyler Creek, F. M. Swann. <b>WISCONSIN.</b> Cadiz, B. C. Curtis. *Delavan, George L. Collie. Embarrass, J. E. Breed. Fond du Lac, J. C. Wedge. Friendship, J. M. Harrison. *Glasgow, Henry M. Crombie. Grantsburgh, M. L. Roby, M. D. Greenwood, H. J. Thomas. Hayward, J. M. Custard. Lincoln, A. J. Looze. Madison, Washburn Observatory. Manitowoc, Miss Clasina Lups. Neillsville, W. Heaslett. *Oshkosh, Prof. W. N. Mumper. Richland Centre, Dr. H. M. Ludwig. Summit Lake, E. S. Koepenick. Viroqua, F. J. Rold. *Waucousta, G. H. Yapp. Wausau, Hinemann Bros. Weston, R. R. Wilkinson. <b>WYOMING.</b> Lusk, F. S. Lusk. Wheatland, M. B. Johnston. <b>FOREIGN.</b> *Burnside, S. A., Dr. C. J. Hering. *Grand Turk, West Indies, Geo. I. Gibbs. Guanajuato, Mexico, Meteorolo- gical Observatory. Hamilton, Bermuda, Gen. Russell Hastings. Havana, Cuba, Dr. Enrique del Monte. Killisnoo, Alaska, Jos. Zuboff. La Logia, Mexico, H. Patrick. Leon, Mexico, Prof. M. Leal. Mazatlan, Mexico, Leon P. Acosta Mexico, Mexico, Meteorological Observatory. *Monterey, Mexico, Dr. Wm. De Rye. Montreal, Quebec, C. H. McLeod.	<b>FOREIGN—Continued.</b> New Westminster, B. C., Capt. A. Peele. Port au Prince, Hayti, Prof. I. Scherer. Pueblo, Mexico, Catholic Insti- tute. *Topolobampo, Mexico, Capt. Jno. Bell. *Zacatecas, Mexico, Jose A. y Bo- rilla. <b>New Stations, August, 1889.</b> <b>WISCONSIN.</b> Prescott Junction, Ariz., E. Mc- Cammon. Bisbee, Ariz., Rev. J. A. Pritchard. Buckeye, Ariz., W. E. Hurley. Pikes Peak, Colo., H. G. Kneeland. Kremling, Colo., T. H. McDonald. Oneida, Ill., T. A. Wetmore. Healdton, Ind. Ter., W. F. Mo- Knight. McCausland, Iowa, Miss Ruby P. Barr. West Bend, Iowa, P. Dorweiler. Carson, Iowa, G. N. Ferguson. Belle Plain, Iowa, H. W. Vandyke. Carroll, Iowa, Moses Simon. Estherville, Iowa, J. H. Barnhart. Murray, Ky., J. P. Jones. Montevideo, Minn., L. G. Moyer. Carthage, Mo., D. R. Goucher, M. D. Ironton, Mo., W. H. Delano. Chesterfield, N. H., A. E. Pierce. Turin, N. Y., R. T. Church. Highland, N. C., Dr. T. G. Harbison. Bement, Ohio, P. W. Burton. College Station, Tex., Prof. Dun- can Adriance. Waco, Tex., W. H. Cameron. Round Rock, Tex., W. Weiss. Panhandle, Tex., Jas. L. Gray. Dallas, Tex., M. E. Glass. Richfield, Utah, Niels Anderson. Moab, Utah, H. J. Crouse. Alta, Bingham, Ogden, Park City, Provo, Stockton, Middletown, Va., A. G. Prior. Nottaway, Va., Geo. Dunn. Waukega, Wis., C. Rice. Honey Creek, Wis., J. A. McIntosh.

*Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for August, 1889.*

<b>ALABAMA.</b> Mount Vernon Barracks.	<b>COLORADO.</b> Crawford, Fort. Lewis, Fort. Logan, Fort. Lyons, Fort.	<b>IDaho.</b> Boise Barracks. Sherman, Fort.	<b>MARYLAND.</b> McHenry, Fort.	<b>NEBRASKA—Cont'd.</b> Omaha, Fort. Robinson, Fort. Sidney, Fort.	<b>NEW YORK—Cont'd.</b> Willett's Point. Columbus Barracks.	<b>TEXAS—Cont'd.</b> Ringgold, Fort. San Antonio, Post at.
<b>ARIZONA.</b> Apache, Fort. Bowie, Fort. Huachuca, Fort. Lowell, Fort. McDowell, Fort. Mojave, Fort. San Carlos. Verde, Fort. Whipple Barracks.	<b>CONNECTICUT.</b> Trumbull, Fort.	<b>ILLINOIS.</b> Rock Island Arsenal. Sheridan, Fort.	<b>MASSACHUSETTS.</b> Springfield Armory. Warren, Fort.	<b>NEW MEXICO.</b> Bayard, Fort. Marcy, Fort. Selden, Fort. Stanton, Fort. Union, Fort. Wingate, Fort.	<b>OHIO.</b> Klamath, Fort.	<b>UTAH.</b> Du Chene, Fort. Douglas, Fort.
<b>ARKANSAS.</b> Hot Springs. Little Rock Barracks.	<b>DAKOTA.</b> A. Lincoln, Fort. Bennett, Fort. Buford, Fort. Meade, Fort. Pembina, Fort. Randall, Fort. Sully, Fort. Totten, Fort. Yates, Fort.	<b>INDIAN TERRITORY.</b> Gibson, Fort. Reno, Fort. Sill, Fort. Supply, Fort.	<b>MICHIGAN.</b> Brady, Fort. Mackinac, Fort. Wayne, Fort.	<b>MINNESOTA.</b> Snelling, Fort.	<b>PENNSYLVANIA.</b> Allegheny Arsenal. Frankford Arsenal. Rhode Island. Adams, Fort.	<b>VIRGINIA.</b> Monroe, Fort. Myer, Fort.
<b>CALIFORNIA.</b> Alcatraz Island. Angel Island. Benicia Barracks. Bidwell, Fort. Gaston, Fort. Mason, Fort. *Presidio, San Francisco. San Diego Barracks.	<b>DISTRICT OF COLUMBIA.</b> Washington Barracks.	<b>KANSAS.</b> Hays, Fort. Leavenworth, Fort. Leavenworth Prison. Riley, Fort.	<b>MISSOURI.</b> Jefferson Barracks.	<b>MONTANA.</b> Assiniboine, Fort. Custer, Fort. Keogh, Fort. Maginnis, Fort. Missoula, Fort. Poplar River, Fort. Shaw, Fort.	<b>NEW YORK.</b> Columbus, Fort. David's Island. Hamilton, Fort. Madison Barracks. Niagara, Fort. Plattsburgh Barracks. Porter, Fort. Schuyler, Fort. Wadsworth, Fort. Watervliet Arsenal. West Point Mil. Acad'my.	<b>TEXAS.</b> Bliss, Fort. Brown, Fort. Clark, Fort. Davis, Fort. Eagle Pass, Camp. Elliott, Fort. Hancock, Fort. McIntosh, Fort. Peña Colorado, Camp.
	<b>FLORIDA.</b> Barrancas, Fort. Saint Francis Barracks.	<b>LOUISIANA.</b> Jackson Barracks.	<b>MAINE.</b> Kennebec Arsenal. Preble, Fort.	<b>NEBRASKA.</b> Niobrara, Fort.	<b>TEXAS.</b> Bridger, Fort. D. A. Russell, Fort. Laramie, Fort. *McKinney, Fort. Pilot Butte, Camp. Sheridan, Camp. Washakie, Fort.	